

The

Communicator

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ARC



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PUBLICATION CONTACTS

**COMMUNICATOR
& BLOG EDITOR** John Schouten VE7TI
[communicator at ve7sar.net](mailto:communicator@ve7sar.net)

SARC TELEPHONE (604) 802-1825

CORRESPONDENCE 12144 - 57A Avenue
Surrey, BC V3X 2S3
[SARC at ve7sar.net](mailto:SARC@ve7sar.net)

**CONTRIBUTING
EDITORS** John Brodie VA7XB
Kevin McQuiggin VE7ZD/KN7Q

The **Communicator** is a publication of Surrey Amateur Radio Communications.

It appears bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote ham radio activity.

During non-publication months we encourage you to visit the Digital Communicator at ve7sar.blogspot.ca, which includes recent news, past issues of The Communicator, our history, photos, videos and other information.

To subscribe, unsubscribe or change your address for e-mail delivery of this newsletter, notify [communicator @ ve7sar.net](mailto:communicator@ve7sar.net)

Regular readers who are not SARC members are invited to contribute a \$5 annual [donation](#) towards our Field Day fund via [PayPal](#).

SARC maintains a website at www.ve7sar.net

DEPARTMENTS

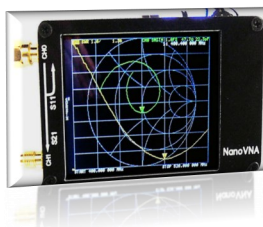
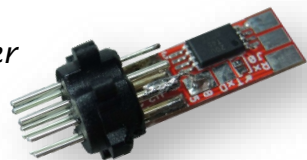
The rest of the story	4
Emergency comms around the globe	9
News you can lose —Ham humour	13
Radio Ramblings	14
Tech topics	26, 27, 48
2-meters	32
Solder Splatter	37
Measurements with the Nano VNA	43
VE7SL's Notebook	58
Foundations of Amateur Radio	64
Back To Basics	74
SARC & SEPAR News	86—108
QRT	107

IN THIS ISSUE



Radio Ramblings—Kevin writes about his moon bounce project

A Yaesu transverter sequencer



Measurements with the NanoVNA—Part 6

...and so much more!



QRM

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...from the Editor's Shack

Do you have a photo or bit of Ham news to share? An Interesting link?

Something to sell or something you are looking for?

eMail it to [communicator at ve7sar.net](mailto:communicator@ve7sar.net) for inclusion in this publication.

Calling on all Amateur Radio Clubs that have a published newsletter! I find that there is a lot of interest in sharing newsletters, ours is certainly a prime example. There are some excellent ones out there with articles and information that extends well beyond their membership. Many clubs now have an Internet presence only but often that is not up to date.

I'd like to invite clubs to forward the link to their newsletter and I will publish them in a future issue of The Communicator.

I thank those who have provided feedback on this publication. I have received favorable comparisons to QST, CQ, TCA and other ham publications.

We have no intent to compete but If we provide a useful

publication beyond our immediate membership, all the better. The one distinction we have is an absence of advertising to clutter our pages. All of us working on this newsletter (eZine?) do so as volunteers with no remuneration, in the true spirit of Amateur Radio. Keep those cards and letters, and emails coming. We appreciate hearing from you.

Heading into September and Fall, we at SARC/SEPAR start a new Amateur Radio year. Lots of events, contests and presentations are ahead. If you have not been active lately, pick up that mic, send a message or try out some of those new modes. Our hobby is like few others. There are so many facets, it is nearly impossible to be an expert at all but it is fun to experiment and there is lots of help if you look for it.

73,

~ John VE7TI, Editor
communicator@ve7sar.net

This Month's Cover...

Fred Orsetti VE7IO, a long time Ham and SARC member and one of my mentors has been recognized for his service to our national organization Radio Amateurs of Canada. The story is on page 12, Fred's Radio-Active profile is on page 91.



On the Web

ve7sar.net

Between newsletters, watch your e-mail for news, announcements of Amateur Radio events, monthly meetings and training opportunities.

Click the links below to follow our presence on the web and social media:

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"It has been said the greatest discoveries are yet to be made." - John Kraus



The Rest Of The Story...

The story of John Kraus and 'Big Ear'



John D. Kraus
W8JK

John Daniel Kraus (June 28, 1910 - July 18, 2004) was an American physicist known for his contributions to electromagnetics, radio astronomy, and antenna theory. His inventions included the helical antenna, the corner reflector antenna, and several other types of antennas. He designed the Big Ear radio telescope at Ohio State University, which was constructed mostly by a team of OSU students and was used to carry out the Ohio Sky Survey. Kraus held a number of patents and published widely.

Kraus was born in 1910 in Ann Arbor, Michigan. He received his Ph.D. in physics from the University of Michigan in 1933. In addition to his professional achievements, he also contributed to amateur radio. His father was scientist Edward Henry Kraus.

Before World War II Kraus developed antennas including the corner reflector and W8JK close-spaced array. He also helped construct and operate the University of Michigan 100-ton cyclotron, then the world's most powerful particle accelerator.

Career

Following the completion of his doctorate, Kraus was a member of the research team in nuclear physics at the University of Michigan, helping to design and build the school's new 100-ton cyclotron. During World War II he worked on degaussing ships for the United States Navy and on radar countermeasures at Harvard University.

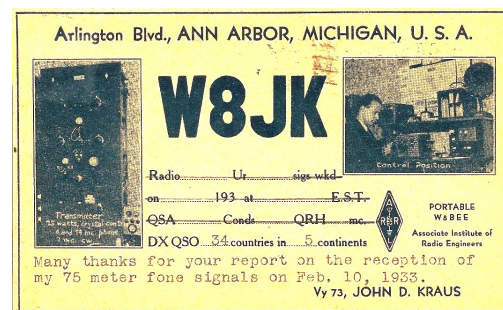
After the war, Kraus joined Ohio State University, later becoming the director of the Radio Observatory and McDougal Professor (Emeritus) of Electrical Engineering and Astronomy. He supervised the Ohio Sky Survey which cataloged over 19,000 radio sources, more than half previously unknown, and later participated in the SETI survey conducted by Bob Dixon.

Sputnik I

In 1958, while he was at Ohio State, Kraus used the signal of radio station WWV to track the disintegration of Russian satellite Sputnik 1. Kraus knew that a meteor entering the upper atmosphere leaves in its wake a small amount of ionized air. This air

reflects a stray radio signal back to Earth, strengthening the signal at the surface for a few seconds. This effect is known as meteor scatter. Kraus predicted that what was left of Sputnik would exhibit the same effect, but on a larger scale. His prediction was correct; WWV's signal was noticeably strengthened for durations lasting over a minute. In addition, the strengthening came from a direction and at a time of day that agreed with predictions of the paths of Sputnik's last orbits. Using this information, Kraus was able to draw up a complete timeline of Sputnik's disintegration. His data also led him to conclude that satellites do not fail as one unit. Instead, his data indicated that the spacecraft broke up into its component parts as it moved closer to the Earth.

QSL card of John Kraus sent to shortwave listener, 1933



Kraus, SETI and the 'Big Ear'

If ever there is a radio astronomer's hall of fame, one of the first inductees would be Ohio State University professor emeritus Dr. John Kraus, the "Big Ear's" proud father.

Kraus emerged as one of the country's leading radio telescope pioneers in the 1940's. His contemporaries included Karl Jansky, a Bell Telephone Laboratories engineer who invented the radio telescope in the 1930s. A good friend, Grote Reber, another radio engineer, helped mold the science.

Today, Kraus, at 84, lives only a few miles from the Big Ear off U.S. 23 in Delaware County. Kraus is still acknowledged as director at the Big Ear, although he is retired from the project.

Kraus designed the Big Ear and built it in the late 1950's with the help of undergraduate and graduate students for about \$250,000. In Kraus' classes, students got a working education. The Big Ear's assistant director, Dr. Robert S. Dixon, says he came to OSU in 1963 because he wanted to study under Kraus. "This was one of the wonderful features of our academic institution," Kraus says. "Because the students in doing this got a fantastically good experience that they would not have obtained elsewhere."

The scope's basic design is similar to a reflector telescope. Its design has been copied for radio telescope observatories in Russia and France.

"Well, the whole idea was a maximum size for a dollar cost," Kraus says. "It achieved that objective. It was designed for mapping the radio sky, and it has been successful finding the most distant known objects in the universe."

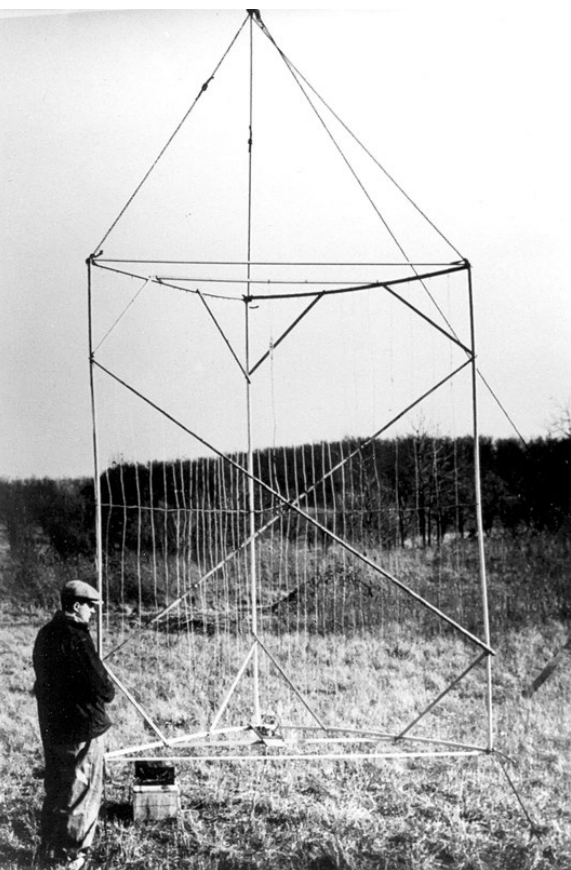
In his 1976 book "Big Ear," [now in a revised edition called Big Ear Two] Kraus talks about starting the search for extraterrestrial intelligence on Dec. 7, 1973.

"There was no fuss or fanfare; switches were set; recorders started and the data began to flow," Kraus writes.

More than 20 years later, the search continues. Kraus won't predict the chances for success, only that "someday, something may occur. But that may be a long ways in the future."

"It's very tough," he says. "It's a lot more difficult than many people think. It may also be something that is found serendipitously. Somebody looking for something else may stumble on it."

Kraus (W8JK) and the first corner reflector antenna; operating at 5 meters wavelength, it could be rotated for pattern measurements.



In radio astronomy circles, Kraus is revered. His textbook "Radio Astronomy," published in 1966, is the bible in the field.

"I think John is a prime mover in SETI [Search for Extraterrestrial Intelligence]," says Dr. Paul Horowitz, director of his own long-running search at Harvard University's Oak Ridge Radio Observatory. "I think John is such a gentleman, too. In fact, John had made a personal contribution to our search, and not an unsubstantial amount."

Kraus is an accomplished man, but he doesn't like to dwell on his fame. His inquisitive nature leads him to be the interviewer. His responses are terse and to the point; he doesn't speculate.

He updated his textbook "Electromagnetics," now in its fourth edition, a year ago. He still carries out electromagnetic experiments at the home he shares with his wife, Alice.

Kraus is a pioneer, but he's not willing to predict the future of radio astronomy. "It's very hard to say," he says. "New discoveries will undoubtedly come. It has been said the greatest discoveries are yet to be made."

Kraus grows tired of the interview. It's the mark of a man who has always asked the questions. His eyes twinkle and it's his turn. "Tell me a little about yourself," he says, warming to the task.

*~ From the Cleveland Plain Dealer
Sunday Magazine section, September 18, 1994*



Social Reminder

Subject to COVID prevention policy in effect at the time, the Saturday weekly social gathering is once again 'on' at the Denny's Restaurant, 6850 King George Blvd., Surrey BC from 07:30—09:30. All are invited. Afterwards, we will host workshops and will be available to invigilate Amateur Radio exams at the OTC, 5752—142 Street, Surrey from 10-noon. Bring your ham issues, our Elmers will try to help you sort them out.

Obituary: Professor John Kraus, W8JK

I am saddened to report the death on 18 July 2004, just three weeks after his 94th birthday, of Dr. John D. Kraus, W8JK, a true renaissance man. John was Professor Emeritus at Ohio State University, where he had taught engineering, physics, and radio astronomy for nearly half a century. Long after his retirement, he was still going to campus daily, to meet with students. Ever the optimist, John had renewed his ham radio license a few days before his death -- for a period of ten years.

Prof. Kraus distinguished himself as a prominent physicist, educator, antenna designer, engineer, writer, publisher, radio amateur, and philosopher. His textbooks *Radio Astronomy*, *Antennas*, *Electromagnetics*, and *Our Cosmic Universe* guided a whole generation of astronomers and engineers, including me. His two volumes of memoirs (*Big Ear* and *Big Ear Too*) inspired a whole generation of radio amateurs (again, including me). His short-lived periodical, *Cosmic Search*, was the world's first SETI magazine, its thirteen issues still cherished by those of us involved in the SETI enterprise. And his designs (including the legendary Big Ear radio telescope) have expanded humanity's knowledge of the cosmos.

It was at Big Ear that the most tantalizing, elusive and enigmatic evidence yet of extraterrestrial intelligence was collected. The legendary 'Wow!' signal received there on 15 August 1977 remained the greatest mystery of John Kraus' life, a detection that fit exactly the expected profile of intercepted radiation from another intelligent civilization in the cosmos. That the anomaly was observed right around the time of his retirement must have been frustrating to John, who would have liked to direct the hundreds of repeat observations that followed. Instead, Kraus turned the effort over to a most able lieutenant. Bob Dixon, W8ERD, had come to Ohio State as a grad student, specifically to study under the best antenna engineer of his day. He was studying there when Big Ear was being commissioned, stayed on as a faculty member, became John Kraus' deputy director, and ran the observatory during its final years.

Those final years of Big Ear came too soon, both for Dixon and for Kraus (who remained actively involved in radio astronomy and SETI well beyond his retirement). The land under the antenna's beautiful 3.5 acre ground plane had become just too valuable, and ultimately the University sold it to the developers. Big Ear, John Kraus'

brainchild and one of the greatest radio telescopes of all time, was ploughed under in early 1998 to make way for a commercial golf course. Such is progress.



On a personal level, it was John Kraus who ordained me as a radio astronomer.

That particular episode occurred a number of years ago at the Ohio State University, where Kraus was already a Professor Emeritus. I had just given a SETI paper to a room full of astrophysicists, and I was justifiably nervous. "After all," I told him afterward, "I'm just an electrical engineer."

"Don't ever say that!" roared Kraus, with a forcefulness which belied his then eight decades. "You are a radio astronomer!"

Right there, I realized I had offended my mentor. (After all, he himself was, first and foremost, an electrical engineer.) "But John..." I started.

"But nothing!" he retorted. "As an engineer, you can very easily learn (and, in fact, have already learned) all the astronomy you need to call yourself a radio astronomer. The converse cannot be said of the physicists."

Over the years, John Kraus remained quick with his wit, frank in his criticism, generous with his praise, and ever supportive of the young upstart with his head in the clouds. I am proud to have been able to call him my friend.

The last time I saw Kraus in person was on 5 November 2000. John and fifty friends gathered on the green at the former Big Ear site, to dedicate an historical marker. That ceremony was not only a memorial to Big Ear, but a tribute to Kraus and his many accomplishments. I know that when Big Ear died, so did a part of John Kraus. That he remained among us, warm, compassionate, and mentally alert for an additional four years, was a gift to all who knew him.

~ H. Paul Shuch, SETI Executive Director



Emergency Comms

Ham Radio Making A Difference

What's your problem?

Tom Cox VE6TOX



Tom Cox (VE6TOX) is the Senior ICS Consultant with the Alberta Emergency Management Agency and a Master Instructor with ICS Canada.

He has taught over 400 ICS instructors in Canada, conducts professional development workshops across North America and has written extensively on ICS and ICS instruction.

He received his first ICS training as a volunteer with the City of Vancouver and the Vancouver Emergency Community Telecommunications Organization (VECTOR).

This is part two of the series "Why do you need the Incident Command System?"

When trying to describe the Incident Command System (ICS) to individuals and organizations, I always start by trying to understand what problems they are trying to solve. Whether it is a problem with the response, coordination with other entities, or trying to wrap their mind around what is an Incident, if I can get them to articulate the problems, I can use ICS to resolve the problems and make the response more efficient and effective. Whether it is looking at a single Incident or trying to move an entire organization into ICS, I always start with "What's problem(s) are you trying to solve?"

ICS solves problems. Forget the history, the terminology, the instructional challenges and organizational resistance and simply understand the problem.

ICS Canada

Various countries in the world have adopted and adapted the concepts

of ICS to their particular needs. This risks "modification" of ICS so that it is less effective and less interoperable, but within an entire country, if everyone is using the same system, then the risks associated with modification are lower.

But there is one modification to ICS that I believe is a substantial improvement over all other systems of ICS and that is the addition of PPOST to the ICS Canada materials.

PPOST stands for "Priorities, Problems, Objectives, Strategies, Tactics". This was added to the ICS curriculum in 2009 by Dean Monterey who was one of the four people who went down to California and brought ICS back to Canada. Where the FEMA ICS uses Priorities and works everyone through the Objectives, strategies and tactics [2], Canada codifies the relationships between Priorities and Incident Objectives.

For the purposes of these discussions, ICS Canada and PPOST will be used throughout.

Three Types of Problems

All problems for any incident or organization fall into three categories:

1. Problems created by the Hazard/Incident
2. Problems created by the arrival of the responders
3. Problems that aren't your problem.

The reason it is important to understand these broad categories of problems is that each requires a different type of solution. Putting all problems into the same basket creates a giant "to do" list and risks using the wrong solution which makes the response less effective, less efficient, and less safe.

Problems Created by the Hazard/Incident

These are the problems that define the need for the response. They are easiest to understand if you separate these problems from the problems of the response by thinking of them without the responders yet on scene. While some problems may arise as cascading events or as an incident continues, think of these problems as "Before the response arrives - why is a response required?"

This is why the all-hazard format works for ICS; you don't have to be an expert in nuclear power plants, tornado dynamics, protests, or hazardous materials to see that the injuries, gas leaks, property damage, or environmental degradation need a response.

You can look and generally see the majority of reasons why a response is required. For most hazards, the danger is obvious. For others, people may not understand their lives or property are at risk.

These problems are the problems created by the hazard.

The solution to these problems is called an "Objective". Objectives solve the problems created by the hazard/Incident. Objectives are always given to the Operations Section of the ICS organization. When the Objectives are completed and there are no more threats, the response can go home.

The Objectives are why we must respond and define when we can go home because there is no longer an Incident. Most important, the Objectives define the response and why everyone in the response organization must be there. You are all there to accomplish the Objectives, even if many are not in the field actually doing the response tactics. You are there because you are doing the Objectives or supporting those doing the Objectives.

Problems Created by the Arrival of the Responders

Problems created by the response do not exist until the responders arrive on scene. They are solely the problems of supporting the responders and have are not defined by the hazards.

The Incident doesn't care that the responders are hungry. The flood is oblivious to time sheets and overtime. A riot doesn't have the capability of thinking that you will struggle if you run out of tear gas or barricades. And a toxic leak goes downhill into creeks and houses whether that makes it harder for the responders or not. A tornado doesn't care that it is creating multiple hazardous spills.

In 1970-1973 the FIRESCOPE task force that created ICS understood that all problems created by the arrival of the responders have nothing to do with the problems created by the Incident and the hazard itself. They looked at the problems created by the arrival of the responders and came up with a solution for every single issue.

Problems of the response are always solved by activating the box on the ICS organization chart or the box above it.

Responder problems are distinct from the problems created by the Incident/hazard because the Objectives apply to everyone; problems of the response apply only to the person filling the one box. This is the division of labour and effectiveness of specialization and execution. The Safety Officer doesn't collect time sheets, the Time Unit doesn't program radios, and the Communications Unit isn't stopping unsafe work practices.

If it is the role of the position on the organization chart or a specific task is assigned to a box on the organization chart outside of the Operations Section, then it is not an Incident Objective. It is not the reason you must be there. When all the responders have been fed, the Incident Management Team (IMT) has the situation defined, when the time-sheets are being completed properly, it doesn't matter that you have done every task and role perfectly if you still have people hurt and dying.

Tasks and roles should never be listed as "Incident Objectives". They do not apply to all responders, they are not the reason a response has been instituted, and you are wasting everyone's valuable time identifying them as everyone's problem rather than walking over to the person who is filling that

role (or the box above) and saying "Do you job" or "Do you need help doing your job?".

Problems of the response are solely resolved by activating the org chart.

Problems that Aren't Your Problem

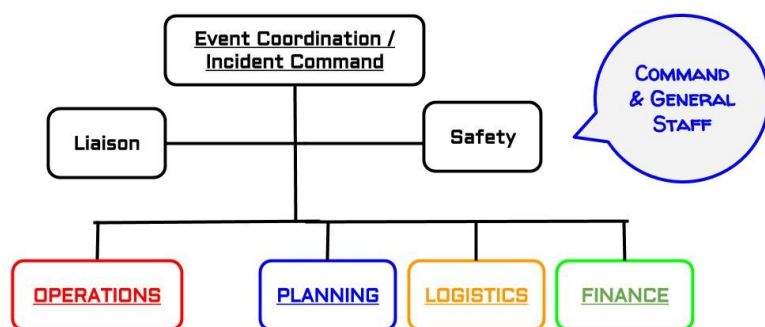
An incident response cannot solve all the world's problems. There are a multitude of problems that get thrown at the Incident Command System that they cannot and should not deal with. They are not your problem.

But (and this is a very big "but"), they are still a problem. Whether you like it or not, these are a problem for someone. They may be due to the economic impacts of the incident, pre-existing problems within the community, or other people's priorities. Incident Command was not designed for loss of tourism, poverty, lung cancer from cigarette smoking, political agendas, religious beliefs, or cultural sensitivity.

Not being "your problem" never means it isn't a problem.

But these problems cannot be solved by the responders and should not come before saving lives, property and the environment. Getting business back may not be possible until the Incident is over. Long-term cumulative issues are not best solved with a knee-jerk response. Politics may have a major impact on the response (as we found with the Covid-19 pandemic) but politics is not the reason for the response. Given a choice between religion and culture and saving your life, the responders must try to save your life. If you don't wish to be saved for religious and cultural reasons, the responders are still compelled to try. Save lives is always the first Priority.

Many of the "Other Problems" are created by the Incident but are not (and possibly should not) be the problem for the responders. But



ICS uses a standard system of naming sections and the positions within those sections.

you can see the connection. Evacuating 500 people to save their lives means 500 people must be accommodated away from the Incident scene. A perimeter may stop people from entering a dangerous zone, but may create traffic chaos on the community. An action of the response, such as releasing water from a overflowing dam to prevent a complete dam failure may cut a rail line and transportation hub impacting all of North America [2].

If it is not the responsibility of the Incident Commander or it is best handled by an entity outside of the Incident response efforts, these problems should be documented by the Incident response (for example, on the 201 briefing form under “actions taken”) as still being a problem. The key is to identify who is the more appropriate party/organization outside of the response, that should deal with the problem or make the decisions concerning that problem.

Never say “It is not a problem”. It is always a problem. By stating explicitly who you sent the problem to for resolution, you show that you recognized that it was a problem and everyone can evaluate afterwards if you were correct in where you sent it.

“Not my problem” is still a problem. Acknowledge and document it as a problem and send it to a more appropriate party/authority/organization to resolve.

Malicious Intent

I want to acknowledge that some Incidents are not natural or technological but are created by human intent. These Incidents include criminal intent, terrorism, war, and/or human induced Incidents. There are two issues that must be addressed with human intent.

First, these Incidents often include an aspect of intentionally interfering with the response efforts to make them ineffective, inefficient, or impossible. Flying a jet into the World Trade Center, having secondary explosives to kill responders, and using arson to start wildfires are meant to make the response difficult or impossible.

Second, the malicious intent adds a level of concern for responder safety. Bunker gear on a firefighter doesn’t stop bullets from an ambush.

As well, even if criminal investigation is not an Incident Priority, it is definitely a priority for police and national security organizations. Criminal investigation cannot always be divorced from the threat to responders and the public, especially in the early response efforts.

For human-induced incidents, there may be the need for an investigation/intelligence to occur simultaneously with the incident response and/or criminal investigation. If you can’t separate the non-emergency justice priorities from the current or ongoing Incident, then the Incident Command System must accommodate a non-emergency role such as incident investigation within an emergency response. This would also apply to Occupational Health and Safety issues and aircraft crash investigations.

Up next:

- What to know to make ICS work
- our uses of ICS - from events to disasters
- Communications Failures and ICS
- Supporting emergencies
- Supporting disasters

~ Tom VE6TOX

[1] Capitalization of specific words and not others is a conscious and deliberate technique to distinguish words with a defined Common Terminology meaning from the exact same word with a potential different and/or contradictory meaning within plain language.

[2] The Minnewanka Dam release during the 2013 Southern Alberta floods cut the main rail line and the Trans-Canada Highway. Effects were seen in Chicago, one of North America’s main rail hubs, within an hour and reportedly within 15 minutes.

Page 12—News You Can't Lose



RAC Canadian Award to SARC member



Thank You Fred !

The Canadian Amateur Radio Hall of Fame (CARHOF) is administered by an independent Board of Trustees, one per province, appointed by the Directors of Radio Amateurs of Canada.

Fred Orsetti, VE7IO, has served on the Hall of Fame Board of Trustees for 12 years as the representative from British Columbia and has recently decided to step down from this position.

The Board sincerely thanks Fred for his dedicated service and contribution to the Hall of Fame and Amateur Radio in Canada.

Fred was recently presented with a RAC Certificate of Appreciation signed by President Glenn McDonnell, VE3XRA.

Due to the rigid COVID public health restrictions in place the professionally printed Certificate had to be sent by mail to Fred but we look forward to being able to do in-person presentations once again.

The Board of Trustees wishes Fred continued success in his many endeavours.

~ RAC

Page 13-News You Can Lose

The Lighter Side of Amateur Radio

Ham Community in Disarray After Discovering First Mentor Actually Named Bruce



Recently discovered documents have revealed that the first ham radio mentor was not named Elmer, but Bruce. The documents were found at an archeology dig beneath a coffee shop in Newington, Connecticut. The key discovery was a ham club's meeting minutes dated April 1, 1914. Just under the agenda item "Discussion: AM Voice - Is it Real Ham Radio?" was a note calling on the club to officially recognize the contribution of "Bruce 'Sparky' McTavish" for his outstanding work in mentoring new hams.

According to ham historian Chris Smart (yes, that's his real name) VE3RWJ, "It turns out that the original 'Elmer' was actually a student of Bruce's. Elmer took over mentoring new hams after Bruce was electrocuted, having accidentally connecting 240VAC to his Morse Code key." Smart continued, "A teacher to the end, Bruce's last moment on Earth provided an important lesson for us all."

As a result of the discovery, the ham community is in a state of confusion. Being against any form of change, most hams say they will still refer to their teachers as "Elmer" despite the new information. However, national organizations are seeking to correct the record and give Bruce his due recognition. The Radio Amateur Society of Australia is going to sponsor a "Worked all Bruces" award and the Radio Society of Great Britain has put forward a proposal to formally change their name to the Radio Society of Great Bruce.

~ Adrian VE7NZ



*Bruce "Sparky" McTavish
- circa 1914*

Radio Ramblings

Kevin McQuiggin VE7ZD/KN7Q

Problem solving



Welcome back, and I hope that you all had an interesting and fun summer. This issue I would like to talk about problem solving and how we as amateur radio operators can apply our knowledge to resolve problems and improve performance of our radio systems.

The Obvious vs the Subtle

Radio systems can have “obvious” problems that are easy to locate and fix, but more subtle problems usually cannot be traced to a specific “simple” error and are therefore much harder to solve. Solution to these problems often requires the insight and creative thinking that comes with experience. We face both types of problems as radio amateurs.

Obvious problems are easy to isolate, and the solutions are clear. For example, a loose connector or a shorted feedline will immediately manifest itself as a drop in radio system performance. We find that we have no audio on our transmissions, or the SWR goes from the usual 1.5:1 “to infinity and beyond!” The symptoms are clear, and the solutions are usually easy to find: we discover that the mic connector has slipped out of the rig, or that the neighbour’s dog has played “chew toy”

with our coaxial cable. We have all been there!

Subtle problems are harder to identify and even harder to track down. Specifications are correct, everything has been built with care and connected properly, but the system just doesn’t work, or its performance is far lower than what it should be. How can we solve this type of problem?

Like the “obvious” problems, these problems can also be emergent: a good example is intermodulation or other interference that shows up on a repeater system that has worked reliably for years. Nothing has been changed within the radio system, every component checks as working properly, but the problem persists. How do we resolve this?

As I will describe below, I experienced a subtle antenna system performance problem this summer. Finding the cause of the problem and resolving it took over a month. Hence the topic of this column!

Solving these problems can take a significant amount of time. It can also require that nebulous factor that we call “experience”, sometimes aided by a fair amount of insight and creative thinking. The problems can be

solved, but it is not just a matter of checking cables, components, and feedlines. It feels great when you “figure it out” and the system starts working as it should.

Amateur Radio’s Perspective

I have written about the unique placement of amateur radio in the technological world before [1]. Amateurs come from all walks of life and share a common interest in radio communications, but most of us (myself included) lack formal training in electronics, radio systems, feedlines and antennas: i.e. the “tools of the trade” that are mastered by all RF engineers and other electronics system professionals.

This broad-based perspective can actually be an advantage for the amateur radio service, as it has generated innovative experimentation with radio that is outside the formally accepted professional standards of industry. In the simplest terms, amateurs “do not know what will not work” [2].

What does this mean? Hams are not subject to the subtle professional constraints that tend to keep formally trained “experts” away from certain areas of research. Unfettered access to explore unusual ideas and conduct creative experimentation has led amateur radio operators to many scientific discoveries: a great example is current propagation theory, developed within the amateur radio sphere in the 1930s.

That said, there have been lots and lots of (bluntly) *really bad* ideas and truly illogical experiments pursued by amateur radio operators in the last 100+ years. Freedom to experiment does not imply that the majority of these experiments are valid. Nonetheless, this freedom from constraint has generated many innovative ideas and even spurred new technologies, so amateur radio continues to prove its value to society.

Other scientific fields have been restrained by these cultural constraints before: good examples are the search for “exoplanets” and detection of extra-terrestrial radio signals. Research into SETI and these other “oddball” fields could represent “professional suicide” for scientists a few decades ago, but they are now accepted fields of research.

In relation to problem solving, amateur radio’s broad perspective allows hams to draw on their experience outside of formal professional training. This can sometimes help them identify solutions to the subtle class of problems that have no obvious, direct cause.

1296 MHz EME Station

As I described in the last column [3], one of my projects this past summer was to get my 23cm EME (moonbounce) station assembled and try to make my first EME contact on that band.

I ran into a subtle problem with performance of my antenna system and spent about a month working to resolve it. I’ll describe the system and the problem, and my eventual resolution of it, as this is a good example of problem solving and how experience can supplant professional opinion.

Station Components

My 23cm station consists of an Icom IC-9700 transceiver that puts out ten watts at 1296 MHz, a 300-watt power amplifier from VHF Design in Ukraine, 50 feet of LMR600 low-loss coaxial cable and two 45-element loop Yagis which are combined using a power divider. I also have a high gain low noise amplifier (LNA) or preamplifier next to the antennas which amplifies the very weak received signals from the moon.

The general layout of the antenna system is shown in Figure 1.



Figure 1 – 23cm 45-element Loop Yagis (2m Yagi at the rear)

The antenna system and LNA are mounted on a 16-foot mast, and the antennas track the moon using software I developed that runs on a Raspberry Pi (rPi) microcomputer.

The logistics of getting the entire setup completed are not to be underestimated. There are several “moving parts” in the project and getting all the components to work together takes a bit of time, especially for the ham new to the mode. I’ve been working on this project for over a year.

The Enemy

Loss is the enemy of successful EME operation. The path loss of EME signals is in the range of 250 dB, as described in the last column [3]. Any received EME signals are exceedingly weak, so it is critical that these signals be amplified as close to the antenna as possible to avoid them being lost due to feedline and other system losses. Boosting received signals “at the front of the system” can make them strong enough to survive the subsequent feedline losses before they reach the receiver.

I placed my LNA right next to the power divider which combines the signals from each of the two antennas. See Figure 2.

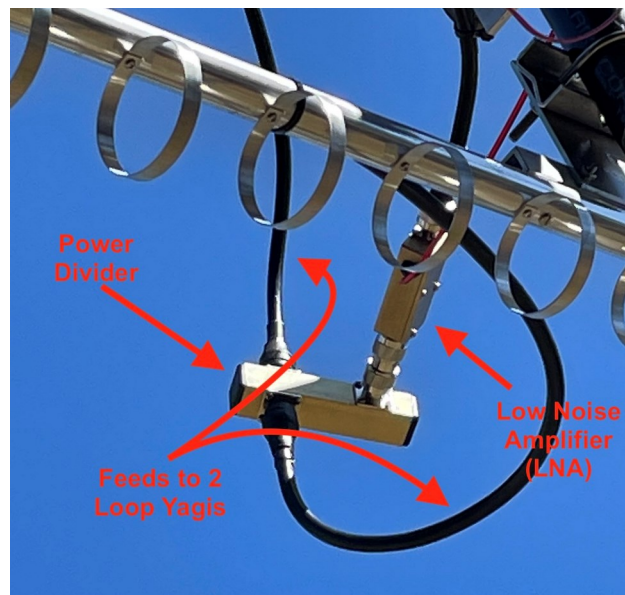


Figure 2 – Power Divider and LNA

Receive Before Transmit

You need to be able to decode signals before you can have a QSO, so my first focus in the project was to achieve consistent decoding of 23cm signals from the moon. I am using the new Q65 mode in the WSJT-X open source software package, as the program is very sensitive and is “where it’s at” for most EME operators these days. There is plenty of 23cm Q65 EME activity so there are lots of stations to work.

Once I got the system set up, I would be ready to receive Q65 decodes. I would proceed towards transmit capability once I had the receive side working.

Disappointing Initial Results

The first month of 23cm EME reception was very disappointing. Although my base calculations (computation of gain and loss figures) showed that I should be able to readily decode Q65 from several of the larger (and even mid-size) EME stations, I had

decoded only a single message from an EME “superstation” in Sweden (SM5DGX).

Nothing worked. I knew that many, many stations were active through my participation in a popular web-based chat server for EME (See www.hb9q.ch). Four of the larger stations even powered up and spent 30 to 60 minutes calling me as I performed system troubleshooting and tried to see them on the WSJT-X waterfall display. I felt like a burden on the entire 23cm EME community. It was depressing.

I checked my cabling, continuity, SWR and the WSJT-X audio and decoding settings. All was well. I checked the IC-9700 setup and made some changes as per direction from other hams on the chat service who had the same rig, but this made no difference either.

“No decodes” became my daily report as the other hams on the chat kept asking if I was operational yet.

I thought that maybe my moon tracking or antenna tracking was off - of course if the antennas are not pointing at the moon, you’ll hear nothing. Many trips outside during the clear days this past summer showed the antennas slightly off centre, so I adjusted my rPi tracking routine appropriately, but this made no difference: no decodes... I also tracked the sun in order to check my antenna pointing (see the photographs in last issues’ column) and determined that the pointing problem was likely not the reason for the system’s poor performance.

Sun Noise

One suggestion made by Bill KB2SA in California regarding my lack of performance would turn out to be key in understanding and resolving the problem. He suggested measuring “sun noise” on the antenna system and comparing it to that of other EME operators.

The sun emits broadband noise at all wavelengths and polarizations and thus will generate a high level of noise in your receiver. To measure sun noise, you point your antennas directly at the sun and record the average noise level in your receiver. You then move your antennas well away from the sun, but at a high elevation to avoid terrestrial noise, and measure the average noise level there as well. The difference in the two noise figures, converted to dB, can then give you a pretty good indication of the sensitivity of your antenna system. Higher dB figures are better.

Additionally, a freely available older version of the WSJT program has a “Measurement” mode that measures average noise in the receiver and converts it to dB. See Figure 3. I downloaded the program [4] and used it to make sun and “cold sky” (i.e. away from the sun) measurements one afternoon. I determined that my antennas’ sun noise figure was about 1.1 dB.

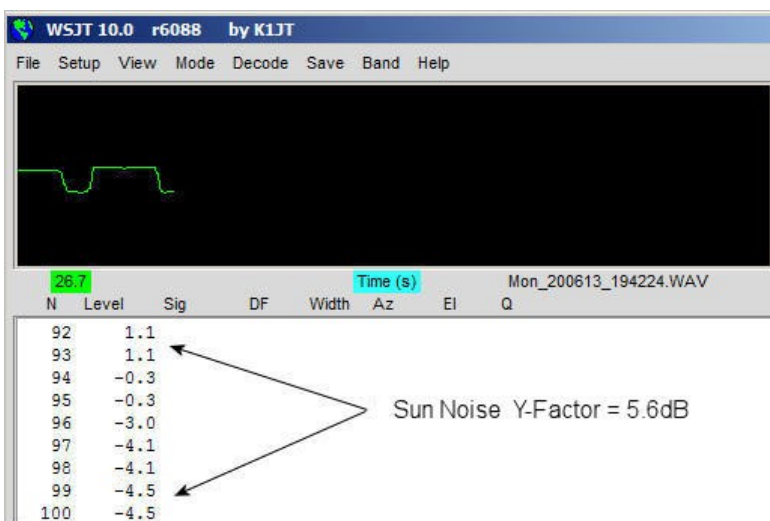


Figure 3 – WSJT10 Measurement Mode [5]

1.1 dB is an extremely poor sun noise figure, and it was a clear indication that there was something wrong with the antennas. A good sun noise value for my antennas would be in the range of 4 to 5 dB. In “human” terms,

the noise in the antenna should have been 3 to 4 times louder than what I was seeing. At least the numbers confirmed that there was a problem!

Troubleshooting

After about three weeks of unsuccessful monitoring and checking the components of my system, I consulted with my good friend Dennis AC7FT, who works professionally in advanced microwave engineering at a major tech company in Oregon. Dennis is a transplanted Canadian engineer and I've known him since the 1990s.

My intuition said that the problem was with the antenna system rather than the feedline or radio setup. Dennis agreed. He suggested a complete end-to-end evaluation of all the components of the antenna system. This would quantify the system's performance and give me a solid numeric foundation on which to analyze the problem.

I spent the next week evaluating my antennas, feedline, and LNA. This took a bit of work as I had to take the entire antenna system apart:

I isolated the LMR600 and obtained a loss figure of 1.7 dB at 1296 MHz for its 50-foot run. This was on par with the specifications for the cable. 1.7 dB doesn't sound like much, but it represents a 32 percent loss of signal over the length of the cable. With reception of weak EME signals, 32 percent loss could put a decodable signal way down into the noise.

Loss through about 15 feet of LMR400UF cable between the end of the LMR600 and the power divider was about 1.1 dB.

The power divider represented about 0.5 dB loss itself. I confirmed that it properly combined energy received from the two ports, and that the two loop Yagis had been configured so that their patterns summed, rather than cancelling each other out.

I checked the LNA using a signal generator and spectrum analyzer by putting a very low level RF input into it and documented both its gain, which turned out to be a very impressive 39 dB, and its noise figure, which I determined to be under 1 dB. This means that negligible noise was being added to the weak EME signals as a byproduct of their amplification by the LNA.

I guesstimated another 2 dB of loss through the various 'N' connectors in the antenna system, and another 2 dB loss through each antenna's 5 feet of coax from the power divider to the antenna feedpoint. These last two figures are probably high, but I wanted to be conservative.

I now had definitive, quantified figures for all of the elements of my antenna system. The beauty of working in decibels is that amplifications and losses can simply be summed to come up with a final figure. From the tear-down I was able to calculate the loss of my antenna system as follows:

Antenna System Component	Gain/Loss (dB)
50 feet of LMR600	-1.7
15 feet of LMR400UF	-1.1
Power Divider	-0.5
LNA	39
Antenna feeders (both)	-2
All connectors (estimate)	-2
Total for System	31.7

Table 1 - Measured Antenna System Performance

The LNA's gain easily overcomes the losses present in the other components of the antenna system, so given that its noise figure as calculated was very low, this indicated that the antenna system was not the cause of my non-decodes. Received signals made it to the receiver about 1000 times stronger (i.e. 30 dB or 10^3) than when they were first intercepted by the antenna.

What other factors needed to be considered?

One critical factor is the gain of the antenna system itself. As the saying goes, “*you can’t make a silk purse out of a sow’s ear*” [6]. Two 45-element loop Yagis (representing approximately 23 dBi gain) represent a minimal antenna system for 23cm EME. There simply may not be “enough metal” in the air to induce detectable current from the received waves at the antenna. Even 31.7 dB of system gain (as calculated above in Table 1) will not be enough to overcome this deficiency. I considered this possibility very carefully.

However, I learned from the chat group and other online resources that other new EMEers with similar minimal antenna systems have indeed seen Q65 decodes, and in fact have also made many QSOs using their systems. My system should be capable of similar performance. There was something else going on.

I put the antenna system back together and decided that I would just think about the problem for awhile.

I rechecked my software and rig settings, did another week of monitoring without a single decode, and even considered that perhaps by IC-9700 had some sort of a problem with its receiver. This seemed unlikely as the rig was almost new, but I did not have any other leads.

I checked the rig’s frequency accuracy and even added a GPS-based frequency standard to the radio. I confirmed that its frequency accuracy was within about 10 Hz at 1296 MHz. This had not been the problem. I still had no decodes.

Intuition

One thing that concerned me when I was evaluating the antenna system was the distance of the two loop Yagis from the

azimuth/elevation rotators on the mast. See Figure 4. The distance from the antennas to the rotators was only about 20 cm. I had mounted the two antennas there as the crossboom on which they would be mounted was only exposed for about 40 cm.

Figure 4 - Original Position of Loop Yagis



I recall that the antennas’ proximity to the rotators (as a large mass of metal) concerned me at the time, but that moving the crossboom would have been complex and required repositioning the 2m Yagi on the other side of the rotators as well. So I mounted the two loop Yagis as in the photo and thought that it would probably be fine.

As part of my discussions with my friend Dennis, I mentioned the proximity issue and he did not think that the short distance would really be of concern. The antennas’ wavelength of 23cm meant that the antennas were about a wavelength from the rotators, so in our discussion we both dismissed this as probably not being a factor in the poor antenna performance. This decision was backed up by other professional sources.

Nonetheless, the proximity of the antennas to the rotators stuck in my mind. I was not happy with it.

Revisiting this issue as part of a re-think of the possible causes of the antennas’ poor performance (and, honestly, because I felt that I had tried everything else!), I decided to go up the ladder and adjust the crossboom anyway, even if “professional opinion” said that it did not matter.

This change would give the two loop Yagis an additional 18 or 20 inches of distance from the large metal mass of the two rotators. Readjusting the 2m Yagi on the other end of the crossboom was a pain, but I was out of other ideas. Even if the literature said “this won’t work” I thought that it was worth a try.

Figure 5 shows the repositioned location of the two loop Yagis on the crossboom. Note the new ~60 cm distance between the antennas and the rotators.

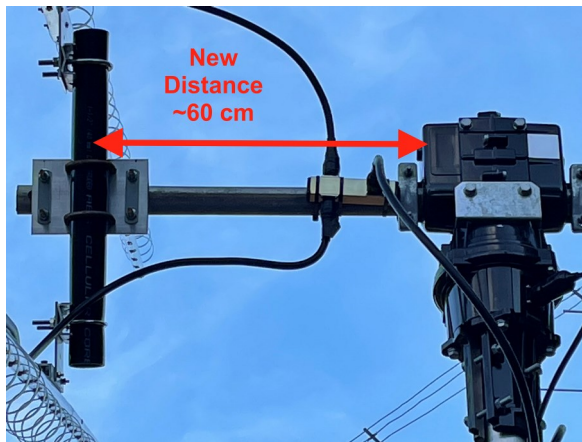


Figure 5 – Repositioned Loop Yagis

Follow-up Testing

Once the antennas had been repositioned, it was back to the shack to see how they worked. Some testing was in order, to make sure that the system still had low SWR and the expected directivity.

Things looked good, so I decided that I would re-run the sun noise test to see if moving the Yagis had had any effect. I was not too hopeful. To my surprise, the new measurements showed that the sun noise figure had jumped from 1.1 to just under 5 dB! Moving the antennas away from the rotators had greatly improved antenna system performance.

I had to wait for moonrise to test the system on actual EME signals. Once the moon was up and clear of neighbouring houses, I went through the usual steps to get the moon tracking program running and started listening for other stations. While I was encouraged by the improved sun noise figure, I was accustomed to failure, so frankly, I didn’t expect much.

Decodes!

The difference in performance was immediate. My first decode was from G4CCH in England. See Figure 6.

----- 23cm									
1703	-22	2.9	875	:	KB2SA	G4CCH	I093	q0	
----- 23cm									
1705	-21	2.9	872	:	KB2SA	G4CCH	R-08	q0	
----- 23cm									
1707	-23	2.9	875	:	KB2SA	G4CCH	73	q0	

Figure 6 – First Decode!

This was followed by decodes of several more stations including Steve K5DOG, who decided to call me directly even though I was not yet set up for transmission. See Figure 7.

Single-Period Decodes									
UTC	dB	DT	Freq	Message					
----- 23cm									
2135	-23	2.8	1059	:	VE7ZD	K5DOG	EM00	q0	

Figure 7 – A “Courtesy Call” from K5DOG

I copied a few other stations and gained my first “hands-on” experience with using Q65 for 23cm EME operation. I noted that the waterfalls often did not show much detail at all for signals which nonetheless decoded just fine, although stronger signals did have easily detectable traces in the Q65 waterfall. I could even hear stronger

signals on the rig's speaker! See Figures 8, 9 and 10 below.

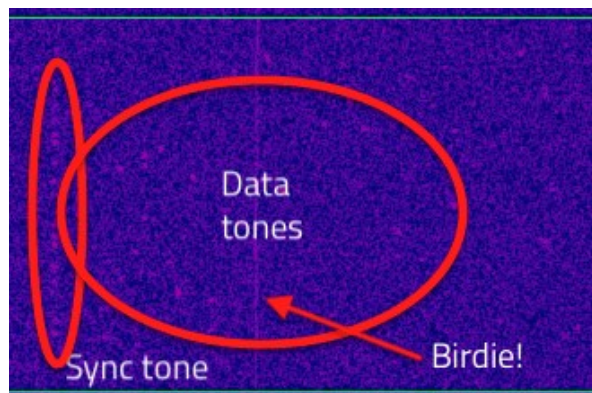


Figure 8 – Decoded Signal, Visible Sync and Data Tones (SM5DGX)

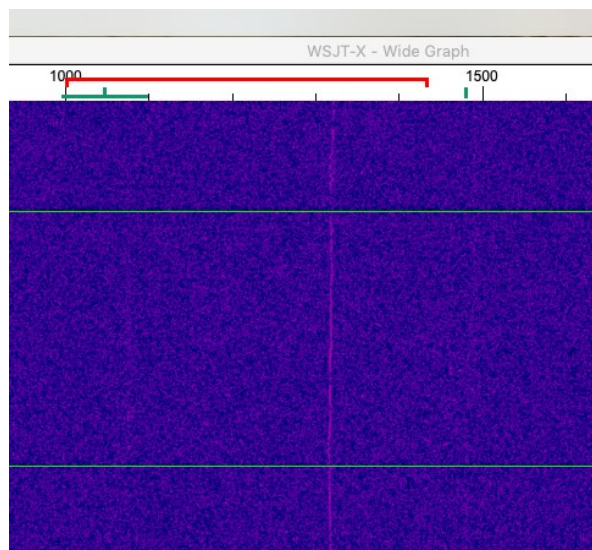


Figure 9 – Decoded Signal, Indistinct Waterfall (K5DOG)

Over the next couple of weeks, I decoded stations on a regular basis, and used the shack time to develop my operating skills with the rig and the WSJT-X program. I was eager to move on to being able to transmit as well as receive.

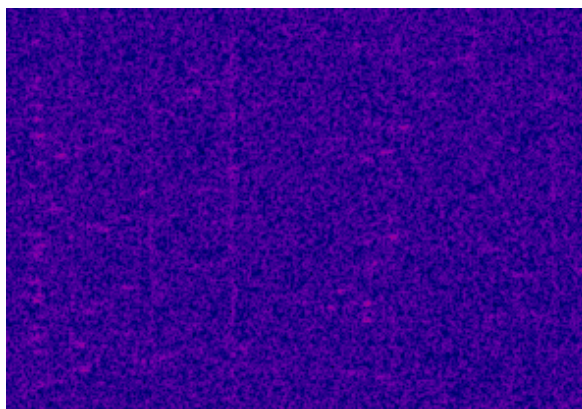


Figure 10 – Decoded Signal, Sync and Data Tones Clearly Visible (KD5FZX)

Next Stage: Transmission

I had my 300-watt power amplifier (PA) all set to go, but unlike on HF or other lower bands, it is not a simple matter to add it into the antenna system. Having an LNA in the “receive chain” right at the antennas means that this sensitive device must be switched out of the circuit so that the high power generated by the PA does not destroy the LNA. Transmit power must be switched “around” the LNA, and the LNA’s input also needs to be switched to a 50-ohm dummy load to prevent the LNA from being overloaded by the nearby TX power. This is accomplished through the use of coaxial relays and an automatic “sequencer”.

The coaxial relays (which are available from all of the amateur radio dealers who handle VHF/UHF/microwave gear) handle the switching of the transmit (TX) and receive (RX) paths and are specially designed to have low loss as well as very high levels of isolation between the outgoing (TX) and incoming (RX) signal paths. See Figure 11. Three SPDT relays are usually employed for this. The sequencer serves to control the relays as well as the keying of the rig and the PA. Figure 12 shows how the relays are

used in my setup to switch the TX/RX path and isolate the LNA from transmit power.



Figure 11 - Typical SPDT Coaxial Relay [7]

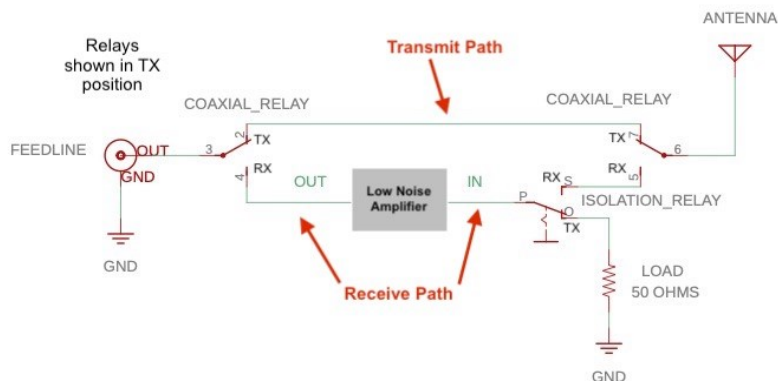


Figure 12 - Relay Configuration

Over the next couple of weeks, I assembled my relays, moved the LNA to the switching circuit and conducted extensive tests to make sure that the LNA would not be “blown” when I applied 300 watts to the antenna system. See Figure 13. The sequencer takes care of switching the relays and powering down the LNA before the rig and PA are keyed.

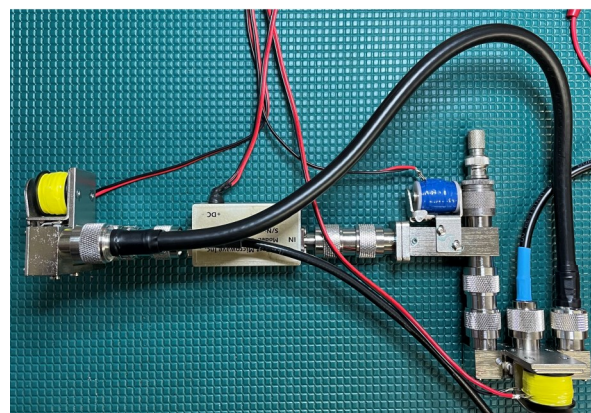


Figure 13 - Relays and LNA

I put the relays in a plastic box on the mast and ran power (12 VDC) from the shack to the mast for control of the LNA and relay system. See Figure 14.



Figure 14 - Relay Box and LNA on the Mast

Culmination of a Big Project: First QSO

On August 29th, just before 2 AM local time here in Burnaby, I successfully completed my first 23cm EME QSO with Anders SM5DGX (grid JO89) in Jarlasa, Sweden. See the WSJT-X screenshot in Figure 15.

The screenshot shows the WSJT-X interface with two panels: 'Single-Period Decodes' and 'Average Decodes'. The top status bar indicates 'Sun Aug 29 1:54 AM' and 'Kevin McQuiggin'. The title bar says 'WSJT-X v2.5.0-rc5 by K1JT, G4WJS, K9AN, and IV3NWX'.

Single-Period Decodes					Average Decodes				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
----- 23cm					0846	-19	3.0	465	: CQ SM5DGX J089 q3 Sweden
0846	-19	3.0	465	: CQ SM5DGX J089 q3 Sweden	0847	Tx		470	: SM5DGX VE7ZD CN89
----- 23cm					0848	-22	3.0	465	: VE7ZD SM5DGX -22 q3
0848	-22	3.0	465	: VE7ZD SM5DGX -22 q3	0849	Tx		470	: SM5DGX VE7ZD CN89
----- 23cm					0849	Tx		470	: SM5DGX VE7ZD R-15
0850	-19	3.0	465	: VE7ZD SM5DGX R-22 q3	0850	-19	3.0	465	: VE7ZD SM5DGX R-22 q3
----- 23cm					0851	Tx		470	: SM5DGX VE7ZD RR73
0852	-22	3.0	465	: VE7ZD SM5DGX RR73 q3	0851	Tx		470	: SM5DGX VE7ZD RRR
					0852	-22	3.0	465	: VE7ZD SM5DGX RR73 q3
					0853	Tx		470	: SM5DGX VE7ZD 73

Figure 15 – First 23cm EME QSO

SM5DGX is a premier station on 23cm, with an 8-metre parabolic dish antenna and a kilowatt of power on the band. A dish this size generates approximately 39 dB of gain [8]. Anders' antenna is about 17 dB (which means $10^{1.7}$) better than my two loop Yagi antennas (at about 22 dBi gain). 17 dB of difference between our antennas equates to a factor of 50.1 - Anders' antenna has 50.1 times as much gain as my two little antennas have. That is quite a difference!

After a self-congratulatory cheer and waking up XYL Laura (VE7LPM) to tell her of my success, I went back on the radio and was able to work an additional three stations on EME in the next hour. See Figure 16 below. I worked ops in Belgium, the USA and England. Signals were quite good, and I could even hear a couple of the stations on the rig's speaker.

After several congratulatory messages on the HB9Q chat server from other ops, I thanked everyone, said my 73s and headed back to sleep. I am looking forward to further EME experimentation and more QSOs in the coming days and weeks.

Conclusion

This has been a big project and huge challenge for me. I have learned an incredible amount and have also had a huge amount of fun. We learn more through failures and setbacks than we do from "clear sailing".

Getting started on 23cm EME took over a year of study, planning and detailed research into many aspects of radio systems that I did not have previous experience with. It represented a huge opportunity for learning and development of new skills in a brand new (for me) area of amateur radio.

I had to acquire or build several new station components: antennas, an LNA, a switching system, rotators and tracking software, a rig capable of operation on 23cm, a PA and necessary control cables and feedlines. I also learned much more about the specialized modes in WSJT-X.

A not insignificant aspect of becoming active on a new mode such as EME is learning new operating techniques, and the configuration of the various hardware and software components of the system. One must also learn new terminology and be able to interact

Figure 16 – Stations Worked in First Session

Call Sign	First Name	Time On	Rx Freq	Mode	Power	RST S	RST R	DXCC Country	City	State	Grid Sq...	Distance
G4CCH	Howard	2021-08-29 09:57:00	1296.06...	Q65	240	-23	-21	England	Gainsborough,...	En...	IO93ql	7361.9 kr
NC1I	Frank M	2021-08-29 09:48:13	1296.07...	Q65	240	-21	-26	United States	SOUTHWICK	MA	FN32ob	3868.1 kr
ON5GS	Dirk	2021-08-29 09:18:00	1296.06...	Q65	240	-28	-22	Belgium	OUDSBERGEN	Li...	JO21sc	7777.6 kr
SM5DGX	Anders B.	2021-08-29 08:48:00	1296.05...	Q65	240	-15	-22	Sweden	JARLASA	Up...	JO89nv	7391.7 kr

with other operators - to learn how they use their systems, what frequencies and sub-modes are used, how contacts are conducted, and what the “norms” are for (in this case) 23cm EME operation.

The importance of learning these operational aspects (i.e. mode of use of the new equipment and technology) cannot be underestimated. Success in any new field (especially a highly specialized one such as EME) cannot be achieved by just buying a bunch of equipment and putting it on the air.

Just because you can buy a trumpet or an electric guitar doesn’t mean that you know how to play it. You need to do the hard work of learning and, most importantly, to practise!

With completion of the first few EME QSOs I have taken a big step in the project, but I still have lots to learn. My station should be capable of working most of the bigger stations on 23cm, but I will need to look at how to improve its performance. I will stick with the system as-is for now, however, and try to push it as far as possible. Eventually, I will run out of larger stations to work and then it will be back to the drawing board to see how I can “up my game” and work more stations. A better antenna system will likely be required.

Finally, through these columns I hope to encourage every one of us amateurs to try new modes and new communication techniques and to develop our knowledge and skills, in recognition of one of the overarching goals over the amateur radio service, “to advance the state of the radio art” [9]. While I describe these projects from a personal perspective, my hope is that some readers will be motivated by my stories and experiences to try some new mode or new aspect of amateur radio themselves. For SARC members, we have a highly experienced group of “Elmers” (i.e. mentors) who can give you support in whatever types of new ham radio projects you would like to try. We are eager to help, so please get in touch.

Feedback on this article can be directed to the Editor, or directly to me at mcquiggi@sfu.ca.

73,

~ Kevin VE7ZD / KN7Q

References:

- [1] Previous columns have looked at the social and innovative aspects of amateur radio, see <https://ve7sar.blogspot.com>.
- [2] See <https://highgate.comm.sfu.ca/thesis> for an overview of innovation within amateur radio.
- [3] See <http://bit.ly/SARC21Jul-Aug> for details.
- [4] WSJT10 (the old version) may be downloaded from <https://physics.princeton.edu/pulsar/k1jt/wsjt.html>
- [5] See http://www.bobatkins.com/radio/sun_noise_measurement.html
- [6] Idiom originated in Scotland, 1600s. See <https://wordhistories.net/2016/12/28/silk-purse-sows-ear/>
- [7] See <https://www.henryradio.com/tohtsu.html>
- [8] See the parabolic antenna gain calculator at <https://www.everythingrf.com/rf-calculators/parabolic-reflector-antenna-gain>.
- [9] Canada’s legislative philosophy for amateur radio is aligned with that of the USA and other ITU nations. The FCC documents the goals of the amateur radio service in Part 97 of their radio regulations: Section 97.1(b) “Basis and Purpose” states that one of the objectives of amateur radio is the “continuation and extension of the amateur’s proven ability to contribute to the advancement of the radio art.” See <https://www.law.cornell.edu/cfr/text/47/97.1>

Hi Kevin,

Just read your moon tracking article [[The Communicator July-August 2021](#)] and found it very interesting. It reminded me of a time many years ago when serving my last year in the military. An officer friend of mine was a keen sky watcher and had just obtained a new telescope. He had me look through it at the moon and move the scope to the right so that the leading edge of the moon was just off the lens edge on the left hand side and I was to say “now” when the edge entered the field of view. I was to watch the leading edge move across the lens and when it reached the right hand side, call “Now” at which time he stopped his watch.

I can not remember the diameter of the objective lens, it was 2.5 to 3”. I was amazed to learn that it only took the moon just over thirty seconds to move across the lens. Radio signals travel at the speed of light but it has to travel to the moon and back again. If that telescope had been an antenna and a signal had been sent when the center of the moon was in the center of the lens and the lens/antenna had tracking software moving the antenna /lens keeping the center of the moon in the center of the lens, the signal would not hit the center of the Lens/Antenna when it returned because it had been moved several degrees away from the original point of transmission.

I know that I am way out of my league with moon tracking but it would appear to me that this software and rotors are for telescope tracking, keeping the object lens on target so that the viewer has a nice steady view of the star he is looking at. Am I way off track here Kevin? Surely, the antenna should remain in it’s transmission position, stationary, whilst waiting for the signal to return.

Robert VA7FMR

Hi Robert:

A very interesting story!

I didn’t want to go into too much detail in the story, but you are correct in that the antenna does stay stationary during transmission. The reason it is not necessary to move the antenna constantly is because of the very wide beam width of the antenna compared to the angular size of the moon. At frequencies such as 144 MHz, the beam width of most antennas, or even antenna arrays, is much bigger than the moon’s diameter, so the moon cannot drift out of the antenna’s coverage during the minute or two of an EME exchange.

Even a very high quality Yagi has a beam width of probably ten degrees, so it is really only necessary to move the antenna every five or even ten minutes. This is similar to a telescope’s beam width as you observed with your friend - the moon took a bit of time to move across the telescope’s field of view. A telescope will have much narrower beam width than a Yagi, especially at a low frequency such as 144 MHz.

So that explains why the antennas don’t have to move constantly.

If one was to try EME at a higher frequency, say 10 GHz, then antenna beam width is MUCH narrower and it is necessary to move the antenna much more often. A parabolic antenna (a dish) at 10 GHz could have the moon “drift out” of the very narrow antenna beam in maybe a minute or two, so pointing (and in particular ACCURATE pointing becomes much more important. Normal HF/VHF “azimuth/elevation” rotators don’t have good enough resolution to be able to point an antenna accurately enough at 10 GHz, so other forms of mechanical mounts are used such as worm gears and repurposed telescope mounts.

73,

Kevin VE7ZD





TECH TOPICS

John Schouten VE7TI

Repair of an IC-208H head unit

It happened in a moment of inattention... I dropped my mic and the hanger caught the screen of the head unit of my Icom IC-208H. The crack was obvious but I thought I could make it less so. I applied some super glue, hoping it would seep in so that I could then polish it out. It didn't.

I found the service manual on-line and discovered that the repair would be relatively easy. But this transceiver is 16 years old, and unlikely a replacement part would be available. I'm a big Icom fan. My first transceiver was an Icom and I've owned several since with great success. I once had to send a Yaesu for repair. The nearest service facility was in California and it took just under a year before I got it back. We're fortunate that Icom Canada has a service depot locally. Staff has always been very accommodating... like when I lost a knob from a handheld. I received a replacement within a day.

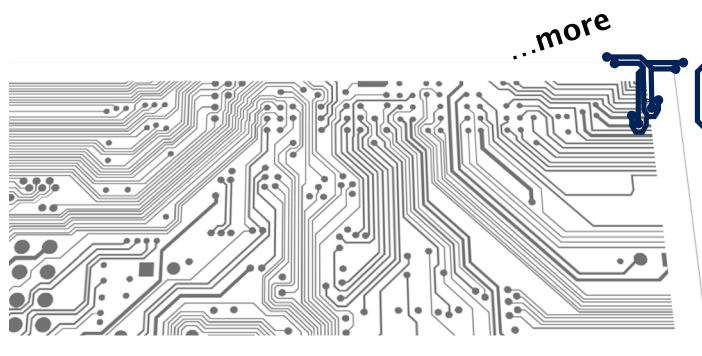
I called the depot expecting to be disappointed. Surprise! The part was in stock, immediately available, and only a couple of dollars.

I remain an Icom fan. The gear works well, is well constructed, and is well-supported - even after years of use.

~ John VE7TI



Left [top to bottom] The crack in the screen and the replacement part; Removing the back of the head unit; Removing the circuit board. Right [top to bottom] The screen pops out with minimal glue residue. The new screen popped in; The successful repair.



TECH TOPICS

Evgeny Slodkevich, UA3AHM/OH5HM, and
Dieter Kuckelkorn, DL1DBY

Using your smartphone on shortwave

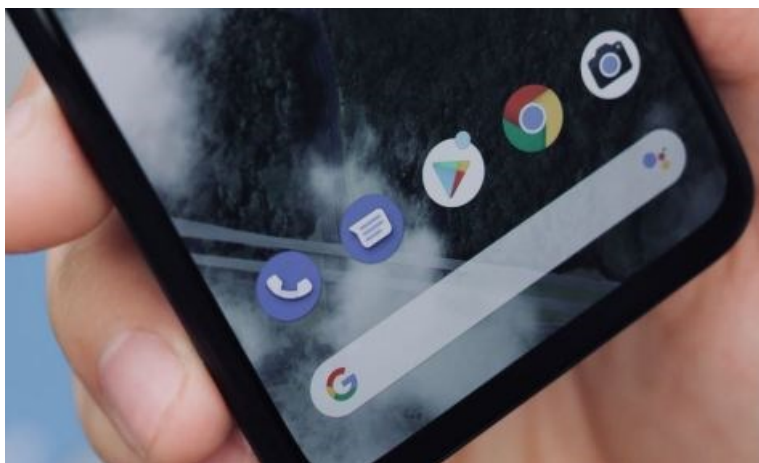
A highly capable HF Data Mode for Android Phones

When going to an outdoor camping trip, we find that in many parts of the world there is no cell phone service available in the back country. To make matters worse, in these areas there is almost never a VHF/UHF ham radio repeater in range when we need wide-area coverage. Apart from strictly local communications using VHF/UHF simplex radio, how do we send messages to friends and family over great distances? How do we call for help? A similar problem can even arise in an urban environment if a major disaster strikes like the break-down of the power grid.

In activities like back country trips in areas without cell phone coverage or in a widespread emergency with the loss of our normal means of communication we can use satellite phones, but this technology is very expensive, requires subscriptions and there is no guarantee that the complex infrastructure of satellite communications will work under all circumstances. The obvious solution for Ham Radio operators will be to switch to shortwave communication using battery operated radios and often NVIS modes of operation. NVIS stands for Near Vertical Incidence Skywave, which means transmitting with special antennas

straight up to communicate with other stations 30 km to 300 km (20 to 200 miles) away with low power - which would be the most useful communications distance if help is needed. We could use SSB voice communications, but this requires that the person we want to reach is sitting constantly at his or her radio to be able to receive the message. This can be a problem: In a real emergency we probably won't have time for this.

We could instead use capable digital modes with automatic message handling capabilities like JS8Call, but these require notebook computers or other complicated setups in the field which consume a lot of energy and can be difficult to recharge off- grid on a reliable basis.



Evgeny UA3AHM/OH5HM and Sergej UA9OV have developed another mode of digital shortwave communications, which aims to be easy to use, capable and - most importantly - friendly to the operator's resources. Apart from a low power battery operated transceiver and a small digital interface, only an Android smartphone is needed, which can be recharged with cheap and readily available consumer-grade solar chargers. Evgeny and Sergej have created an app called "HFpager" which allows to use the smartphone's sound chip to encode and decode audio signals in the SSB audio passband of the transceiver - similar to PC based modes like FT8 and JS8Call. It uses rates of transmission of 1.46, 5.86, 23.44 and 46.88 baud. Modulation is 18-tone Incremental Frequency Shift Keying (IFSK) with forward error correcting Reed-Solomon code RS(15,7) and a superblock by 4 RS blocks with interleaving.

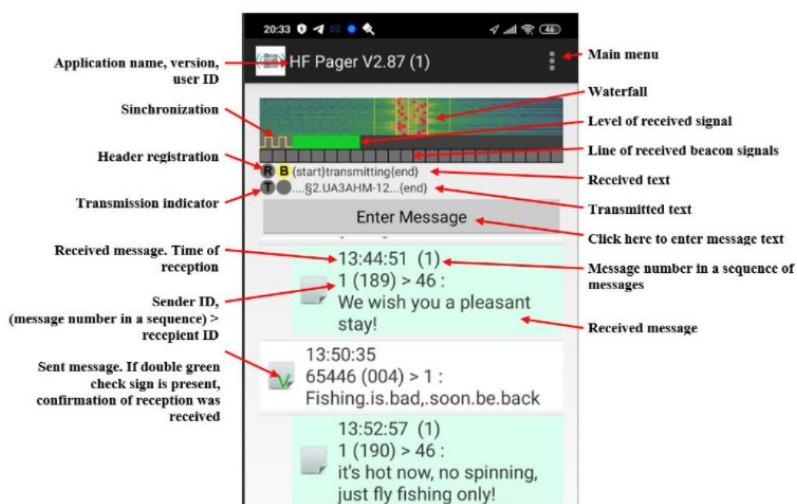
It is possible to send text messages and GPS position reports with the position being instantly visible in Google Maps or [Maps.me](https://maps.me), a service with allows the map to be stored on the smartphone and to be used off-line. All message are automatically stored on the phone to be retrieved later, if desired. The sender can request an automatic confirmation by the receiving station. There is the possibility to send and receive

automatic beacon transmissions including the GPS position in regular intervals, to let the outside world know that our station is still "alive and kicking" or to share the progress we make on our way with our friends.

The app allows text messaging between two stations operating on the same frequency, like in a SSB or CW QSO. There are no group calls like in JS8Call, nor is there a kind of rudimentary networking possible like in JS8Call, to keep things as simple as possible. In contrast to JS8Call not only latin letters are allowed, but also cyrillic letters. The app includes an audio frequency waterfall display well known from FT8 or JS8Call software.

The app was tested by the two authors of this article on 20m over a distance of 2100 km (1300 miles) using only 1 watt of transmitting power and a ground plane antenna hanging from a tree in a public park in Frankfurt (Germany). On the other side near Moscow a 3-element beam and 20 watts were employed. This represents a typical configuration with one station somewhere in the "great outdoors" and the other representing a home base. On the German side an Elecraft K2 transceiver and a DigiLink Nano interface by HB9ZHK were used, on the Russian side an Yaesu FT-450 and a RAIS-1 interface. The DigiLink Nano interface has its own sound card build-in which is reliably recognized by Android. It was chosen because it draws very little current. The RAIS-1 interface and a special version RAYS-4 for Yaesu transceivers use the smartphone's sound chip, but have their own vox circuitry integrated. The RAIS-1 does not need an external voltage nor draws any current, the DigiLink Nano and the RAYS-4 receive the required voltage from the smartphone.

It was easily possible to stay in contact using this setup for the whole test period of three hours. The 1 watt signal was received



with S3 near Moscow. It would have been possible to significantly reduce transmitting power or use a less efficient and smaller portable antenna, as HF Pager should be theoretically able to decode signals up to 27 dB below noise level.

In further testing it was possible to employ only 0.5 watts to keep the connection stable in a slightly different configuration as described above. This time a dipole antenna in sloper configuration and 5 watts of transmitting power were used on the other side near Moscow. As the 20m band was heavily congested due to a major HF contest and as the ionospheric conditions were pretty bad, so sometimes a lower transmission rate of 1.46 Baud had to be used. This proved to be reliable over a period of several hours. In these difficult band conditions HFpager appeared to be as capable as JS8Call.

The current draw of the app was moderate. Over a time frame of three hours with intensive use of the app and full brightness of the display the battery indicator of their smartphone went down from 100% to 63%. The app never crashed even when using a cheap Chinese smartphone that has problems in this regard. The user interface of the app includes a waterfall display known from FT8 and JS8Call applications and indicators for receiving and transmitting. Text sent by other stations other than the operator's correspondent will be decoded and displayed as well, if the station is on the same frequency, as all forms of encryption would be illegal in Ham Radio.

In Android, switching on OTG capabilities can be required as well as allowing for external sound chip support (look in developer settings). It is essential that audio notifications are temporarily switched off in Android when using HFpager for obvious reasons. It can be necessary to disable battery-saving mode for the app in the Android battery settings. As with all HF

digital modes it is important to switch off transceiver TX voice compression and to be careful not to overdrive the transmitter as HFpager is a 100% duty cycle mode like FT8 and JS8Call. To be on the safe side 25 watts when using a standard ham radio 100-watts transceiver and around 5 watts with a 10-watts QRP transceiver are recommended TX power levels.

The user experience is meant to be as close as possible to popular messaging apps like Whatsapp and Telegram, because HFpager is not only targeted at the Ham Radio community. In the Russian Federation, only 16 percent of the territory have cell phone coverage due to the enormous size of the country. Huge areas in Siberia and the Russian Far East can probably never get sufficient coverage. A solution like this is therefore very useful for outdoor enthusiasts, geologists, hunters etc. Having this in mind the app developers chose numerical station identifiers, like in DMR. To operate legally, the ham radio enthusiast has to transmit his or her call sign as message text every 10 minutes. The automatic beacon feature has the capability to include the call sign automatically in CW at the end of every transmission. As non-ham operators usually don't own radio gear and as not all ham gear is up to the task, Evgeny has developed a very small and light battery operated low-power HF transceiver called "Uleyma-80" (named after a river in Russia) with three fixed-frequency channels for net or emergency frequencies that must be specified while ordering. Included is a 12 Volt Li-lon battery that allows operation of the transceiver for very long periods of time, a carrying case and shortened dipole antenna tuned to the desired frequency. The antenna can simply be thrown into the next tree, as NVIS communication does not require great antenna heights. The transceiver uses only 30 mA of



current on receive mode and is extremely simple to operate and is specially designed for this purpose as it allows connecting a smart-phone with a regular and widely available audio cable. It also allows use of a typical smartphone headset with microphone for SSB voice transmissions, should the user prefer to communicate this way. Non-ham users have to obtain a commercial radio license to use the transceiver, according to the resident's laws.

Apart from the Android app available in Google Play there is now a Windows base station software available and, as the newest development, an Android-based gateway that allows messages to be relayed to and from the regular SMS mobile phone service, to communicate with GSM phones around the world in both directions. Check your local laws whether this service may be used by Amateur Radio operators in your country. Also under development is a HF/VHF crossband repeater.

This repeater can be placed at the outskirts of a settlement or city outside the urban high RF noise environment to relay the HFpager messages on VHF to a home base in the center of the village or town. Please note that setting up an unmanned ham radio station may require a special licence in many countries.

Click [here](#) for the latest developments from the website.

The Android app website:

<https://nvis.club/en/hfpager/android>

The Windows app website:

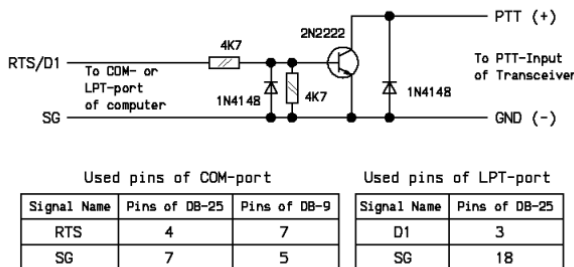
<https://nvis.club/en/hfpager/android>

~ Our thanks to Stephen, G7VFX and Southgate Amateur Radio news for this item

Connecting your computer sound card and your transceiver

You may already have an interface for digital modes, but this is a simple one to make yourself. Audio output of the transceiver should be connected with the line or microphone input of the sound card, and one of the sound card output channels should be connected with the microphone input of the transceiver. The

The simplest PTT-interface



transceiver should be run in SSB mode. This method of signal generation is AFSK (audio frequency shift keying).

It is VERY important to avoid overload of the sound card input or the microphone input of the transceiver. Use external attenuators to reduce output levels of the card and transceiver. If you overload the sound card pre-amplifier, you can't eliminate the overload with the sound card controls! The same is also true for the microphone input of the transceiver.

For TX/RX switching you can use the transceiver's VOX or a simple circuit connected between the COM- or LPT-port of the computer and PTT input of the transceiver. Some USB interfaces can be used also. The simplest schematic of a PTT interface is shown below. When LPT-port is used, a good way is to use a pin that has low voltage level after a computer reboot.

~

Ham radio in Yachting Monthly magazine

Yachting Monthly magazine looks at the use of amateur radio on the ocean waves and interviews Bill Walker M0WTW

The magazine article by Barry Pickthall says:

“Bill Walker [M0WTW], a retired electronics engineer and life-long ham Radio enthusiast who sails a Halberg-Rassy 37 with his wife Judy out of Chichester, has his radio shack in his back garden, high on a hill in Tunbridge Wells where he gets a 90-mile signal range on VHF and worldwide coverage on HF frequencies when propagation is good.

‘There is no restriction on listening to broadcasts over the ham net, but the authorities are now very proactive in policing rogue ham radio operators,’ he says.

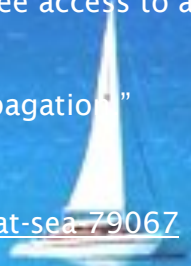
For a start, there is an international language code to be learned when abbreviating common phrases to make it easier to understand when the signal strength is poor.

An amateur radio licence opens up a range of communication types, including free access to a network of amateur satellites and worldwide radio connectivity via the internet.

These types of communications are not affected by the vagaries of HF radio propagation.”

Read the full article at:

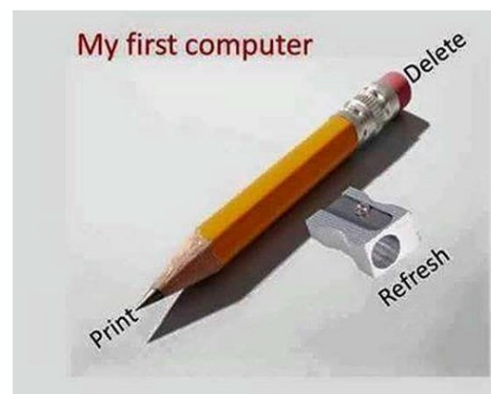
<https://www.yachtingmonthly.com/gear/hf-radio-or-sat-comms-communication-at-sea-79067>



A Kickstart for Cycle 25?

The solar scientist who's been bucking the tide of pessimism from most of his colleagues and predicting a huge sunspot cycle (see News Bytes, Sept. 2020 issue) continues to see lots and lots of spots in the future. According to spaceweather.com, Scott McIntosh of the National Center for Atmospheric Research in Colorado, along with colleague Bob Leamon of the University of Maryland / Baltimore County, are predicting that a “terminator event,” in which oppositely charged magnetic fields collide near the sun's equator and annihilate each other, will be occurring soon. This is a normal occurrence between solar cycles, they say, but the key to predicting the strength of the new cycle lies in the timing between terminator events — the longer the time between them, the weaker the new cycle will be. They are predicting a short 10 years between the previous terminator event and the upcoming one, and McIntosh says, “If the Terminator Event happens soon, as we expect, new Solar Cycle 25 could have a magnitude that rivals the top few since record-keeping began.”

Asked about the fact that most other solar scientists feel the new cycle will be a weak one, like its predecessor, McIntosh replied, “What can I say? We're heretics!”



2meters

Bob Witte K0NR

GMRS: Basic Radio Communications

Bob maintains a great blog site at [https://www.k0nr.com/wordpress/](https://www.k0nr.com.wordpress/).

Contact Bob at bob@k0nr.com.

You can also check out his book [*VHF, Summits and More: Having Fun With Ham Radio*](#).

Note that this article was written for US readers, in Canada the rules are different as they may be in your country. For Canadian regulations, please see the article that follows.—Ed.

Lately, I've been talking with people in search of basic radio communications for their friends or family. They end up talking to me because someone steered them to ham radio as a solution and I teach ham radio license classes. Of course, I am happy to pull them into the wonderful ham radio world but sometimes the General Mobile Radio Service (GMRS) might be a better way of meeting their needs.

I have a GMRS license and have written about it. See [GMRS: The Other UHF Band](#). GMRS is a good fit for local communications, perhaps just using simplex or with repeaters, if available in your area. FCC regulations (Part 95) require you to have a license (and pay a fee) to use GMRS. Unlike ham radio, the license does not require you to pass an exam and the license is valid for you and your family members.

Common Uses

GMRS works well for family communication “around town” or some local area. Depending on the type of equipment used, simplex range of 10 or 15 miles is achievable, maybe more. The use of repeaters can extend this a lot further. You might even decide to put a GMRS repeater on the air, which is not too difficult of a project.

Another common use of GMRS is when a group is traveling down the highway in multiple vehicles. Yes, you might be able to just use your mobile phone to stay in touch but a two-way radio may be a better solution (especially when mobile phone coverage is poor or non-existent). Many off-road vehicle clubs have discovered GMRS and use it for communicating during trail rides.

GMRS is also a great tool for outdoor activities such as camping, hunting, hiking and skiing. It is a handy way of staying in touch with your tribe, while not depending on the mobile phone network.





GMRS Is Not FRS

A GMRS handheld transceiver made by Wouxun.

GMRS often gets confused with the Family Radio Service (FRS). They both include the use of inexpensive, low-power handheld radios and they share many of the same frequencies.

When the FCC authorized FRS, GMRS was already an established radio service and it squeezed FRS into the same band. FRS radios were limited to lower output power, so many manufacturers decided to offer combination FRS/GMRS radios, which operated at higher power levels. The user was supposed to obtain a GMRS license to use this type of radio but most people didn't bother with it. (Most people probably didn't even know of the requirement.) The FCC also specified 2.5 kHz (half deviation) FM for the FRS radios on the same channels as the existing 5 kHz deviation GMRS radios. Intermingling an unlicensed radio service with a licensed service was probably not a wise move. In general, the FCC regulations caused a lot of confusion between the two services.

In 2017, the FCC adopted a [major revision](#) to the GMRS rules to clean up some of the problems with the service. In particular, the regulations now prohibit the sale of combination FRS/GMRS radios. A great idea but a bit too late in the game.

The US GMRS rules are pretty easy to understand, so take a look here: [FCC Part 95 - Personal Radio Services](#).

Equipment

There are basic handheld transceivers for GMRS. They look and act a lot like the FRS radios that are widely available, but GMRS can provide more capability. An advanced handheld radio will have support for using repeaters (transmit offset) and higher power (up to 5 watts).

This GMRS radio has the display and controls integrated into the microphone, for easy installation.

To dramatically improve the radio range, you can use GMRS mobile and base stations that can run even more power, up to 50 watts. More importantly, you can use external antennas on your vehicle or your house. These can make a huge difference in performance. (FRS is limited to handheld transceivers and the permanently-attached rubber duck antenna.)

For radio amateurs, this should all sound pretty familiar. GMRS looks and acts a lot like an FM transceiver on the 440 MHz (70 cm) band. It is a great alternative for local radio communications for people not interested in a technical hobby such as amateur radio.

~ Bob KØNR



This book is an easy-to-understand introduction to VHF/UHF ham radio, including practical tips for getting on the air and having fun messing around with radios.

Learn about FM, SSB, repeaters, equipment, band plans, phonetics, portable operating, Summits On The Air (SOTA) activations and more.



GMRS in Canada

There are big differences in GMRS rules between the US and Canada. If you understand the rules, you'll understand what you need to look for when purchasing GMRS radios, and you'll understand what channels to use to get better range. And you'll understand why you could get in trouble for using some US radios that are not approved for use in Canada – and vice versa.

Radios must be approved in the country of usage

Every GMRS radio has to be approved by the authorities of the country where you will be using the radio – Industry Canada (IC) and the FCC in the US. There are also rules for usage. If the radio does not have an IC number, it's not approved for use in Canada. If the radio does not have an FCC number, it's not approved for use in the US.

[Industry Canada has a lot of information here.](#)

GMRS – FRS with more channels, and *maybe* more power

GMRS is an evolution of FRS that is compatible with older FRS radios on the FRS channels. But there are significant differences between Canada and US regulations.

Licensing, power limits, antennas and repeaters

In Canada, GMRS users do not require a license. In the US, radios above 0.5 watt require a GMRS license. In Canada, you're limited to 2 watts power on the GMRS and combined GMRS/FRS channels, and 0.5 watts on the GMRS channels. In the US, if you have a license, you can go to 5 watts on the GMRS/FRS and GMRS channels.

Repeaters. There is no provision for legal usage of GMRS repeaters in Canada. In the US, licensed users can use GMRS repeaters and GMRS radios with repeater capability.

Antenna. In Canada, the antenna must be fixed on the radio. It cannot be removed, and it is illegal to replace or modify it. In the US, licensed users can change the antenna.

What's the range of my radio? How is it affected by power?

Most of the radios you buy in big box stores in Canada and the US are designed to be legal for unlicensed usage in both US and Canada – which means you will be limited to 0.5 watts, a quarter of the power you're allowed to use in Canada. The ranges they advertise are generally ridiculous, varying from 20 km to 80 km (50 miles).

Finding the power rating for the radio is not always simple. Most manufacturers don't tell you. We've checked the packaging, manuals and web sites for the two biggest manufacturers, and it was either not there or very difficult to find. We've never seen a radio rated for the full 2 watt maximum. The closest we've seen is 1.92 watts, advertised with a 80 km/50 mile range. We've seen 1.6 watt advertised with a 50 km range. So everything is approximate.

Another hint is the batteries. A 0.5 watt radio might have a battery compartment for 3 x AAA batteries. A radio with 1 watt, 1.5 watt or just under 2 watts might have 3 or 4 AA batteries to handle the extra load.

...more **2** meters

Bob Witte KØNR

Can you hear a 1dB change?



Decibels are commonly used in electronic communications to describe and compare signal levels. I've often heard that one dB is considered to be the smallest change that a typical person can detect by ear. I recently came across this website audiocheck.net that is set up to generate different audio tones and to do a blind test of how small of a change you can detect.

I started with testing for 6-dB and 3-dB changes. Easy Peasy. Then I tried the 1-dB test. I could detect the change in level fairly

consistently but I did have to concentrate. Continuing on to the 0.5-dB change, I had a very high failure rate. It was very difficult to detect that small of a change. So I have to conclude that 1 dB is about the limit for a change I can hear.

How about you? Take the test on the website and let us know how you did.

There are many other audio tests to explore on that site, including the highest frequency you can hear, the minimum pitch change you can hear, etc. Check it out: www.audiocheck.net

~ Bob KØNR

Need more reading material?

If you're looking for some additional reading, we have a solution for you. All of our past issues of **The Communicator** are available via our blog site. Over 10 years of Amateur Radio related articles, reviews, projects and much more.

Just scan this QR-code with your cellphone camera or click on <https://ve7sar.blogspot.com/search/label/The%20Communicator>



Ham News

Does the future of CW look like this?

The Premier Morse Translator/Transceiver?

Tired of trying to learn Morse code? Searching for a state-of-the-art decoder/encoder companion for your station that keeps right on working when the band gets noisy, and doubles as a portable QRP transceiver? Stop looking! It's here!

The DMX-40 is revolutionizing amateur radio CW communications with its extraordinary ability to decode in noise, and delivering you more features than you think could be contained in this handy, ingenious little piece of equipment.

Hear CW in noise

PreppComm's customers are impressed with its intuitive functions and ease of use. Finally you can extract clear text from CW in the noisiest of conditions. Really! And its built-in receiver is considered to be better for CW than transceivers costing much more!

As well as allaying the frustrations of seasoned operators listening to code, this fascinating pioneer product supports learners—either as they hear it coming in and see it translated into text on the interactive GUI, as they hear their keyboard-entered text translated to Morse code, or as

they watch the decoder process their manual keying to sharpen their sending skills.

Any license level CW

Whatever your license level, within your band limitations, you now have access to CW communications that you could not previously interact with for lack of proficiency in Morse code. The included keyboard provides a type-ahead feature, accesses frequency-memory lists at a stroke and quickly executes commands or unlocks commonly shared information via single-key shortcuts.

Your ham radio programs

You can define your own micro programs to focus on your chief ham radio interests and access them on the touch screen or keyboard. Calling and answering are automated and displayed, or replaced with your own micro programs. Touch screen convenience gives you a view of what's in the type-ahead buffer and rapid entry into comprehensive help menus.

<https://preppcomm.com/dmx-40-transceiver-2/>

Videos: <https://preppcomm.com/product-review-videos/>

~ Stephen G7VFX



SOLDER SPLATTER

Wayne Getchell VE3CZO

Yaesu Transverter Sequencer in a Mini DIN

Version: This document is for printed circuit board version 2.2

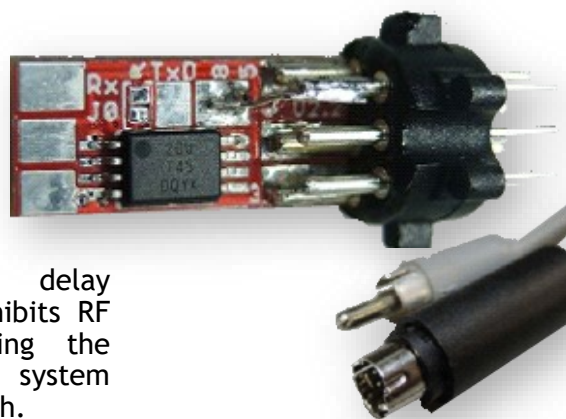
Overview & Features

The key function of a transverter sequencer is to make sure the transverter, and associated equipment, such as a transmit - receive relay or power amplifier, have time to safely switch to transmit before RF power is applied.

Then, on switching from transmit to receive, the sequencer will also insure RF power is removed before transitioning and provides a delay that is long enough to prevent relay chattering during CW operation. This microprocessor controlled circuit does that while fitting into the 8-pin Mini DIN connector used with the Yaesu ACC port. This sequencer has the following function and features

- Uses the ACC Tx-Gnd open collector output to sense a request to change state between transmit and receive.

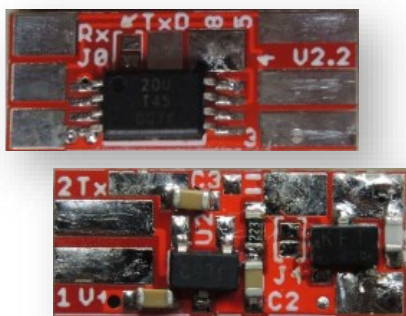
- * On changing state from receive to transmit, it drives the PTT output while also creating a programmable delay (StartDelay) that inhibits RF power by controlling the TxInh pin until the system has had time to switch.
- * On changing state from transmit to receive, it provides a delay (Hangtime) extending the transition to avoid excessive Tx/Rx relay switching during CW operation. After Hangtime expires the PTT state is changed. Four default Hangtimes are provided in the firmware. These delays are programmed as defaults in the firmware and can be selected at build time dependine on the mode being used and CW speed. 25 ms is used for SSB or digital modes, 300 ms is recommended for code speeds greater than 30 words per minute, 650 ms for



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If you want to use any part or all of it for profit let's talk.



Important Note

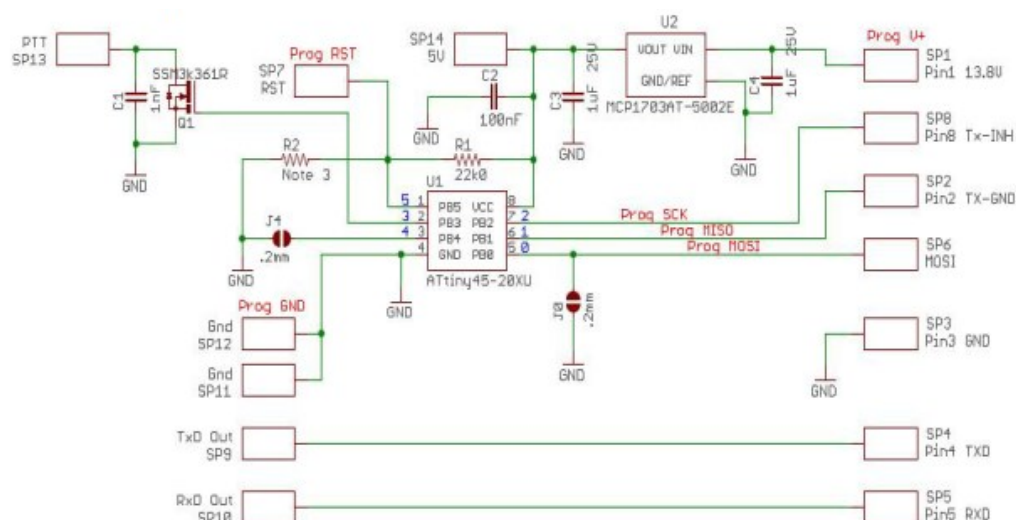
This controller provides only two delay times, one while transitioning from receive to transmit and a longer delay when transitioning from transmit to receive. If your set-up requires a multi-stage sequencer, for instance, removing power to a pre-amp then keying the transceiver then enabling a power amplifier, the additional delay sequences must be done elsewhere.

code speeds greater than 15 words per minute and 1000 ms for code speeds greater than 10 words per minute.

- The PTT output is an open drain configuration that, during assembly, can be populated as either high or low during transmit.
- StartDelay is programmable and defaults to delaying TxInh for 25 ms after PTT changes state when transitioning from receive to transmit.
- * Hangtime delay can be selected to be 30, 300, 650 or 1000 milliseconds by shorting solder jumpers when populating the PCB.
- * Provides pins for TxD, RxD, and GND at the rear of the PCB to allow easier connection to external rig controllers through the Mini DIN connector.
- * Operates over a wide voltage range, six to fifteen volts, and uses minimal current, about 1.5 mA.

Circuit Description

Mini DIN Sequencer V2.2 Circuit Schematic



Hardware

The circuit is powered by the ACC port's 13.8V supply pin. A MCP1703 five volt low drop out regulator U2 provides the supply voltage for the microcontroller. C3 and C4 provide bypassing for the regulator to insure its stability.

U1, an Atmel ATtiny45 processor in an 8 pin small outline package, is the heart of the controller. This micro has six I/O pins and the design uses 4 as inputs and 2 as outputs.

Pins 2 and 7 are programmed as outputs. Pin 2 (PB3) drives the gate of Q1, a 100 Volt 3 Amp N channel FET. The drain of this device is the Push to Talk (PTT) output. C1 is an RF bypass capacitor.

Pin 7 (BP2) connects to the ACC pin 2, Tx-Inh. Tx-Inh is used to prohibit or enable the transceiver's RF output.

Pins 1, 3, 5, and 6 are programmed as inputs. Pin 1 (PB5) is programmed as an analog input, and is connected to a voltage divider formed by R1 and R2. The voltage at pin one determines whether the PTT output is active high or low. If R2 is not installed, the voltage at Pin 1 will be five volts and active low is used. If R2 is present it lowers the voltage measured at pin 1 and active high is used. Pin3 (PB4) and pin 5 (PB0) are configured as inputs with internal pull-up's enabled. The two inputs are programmed to form a two bit binary word with PB4 set as the most significant bit. Together they are used to select Hangtime. If jumpers J0 or J4 are left open the internal pullups will take the inputs high, if the jumpers are soldered closed the inputs are held at ground. Hangtime delays are programmable. The default values chosen are:

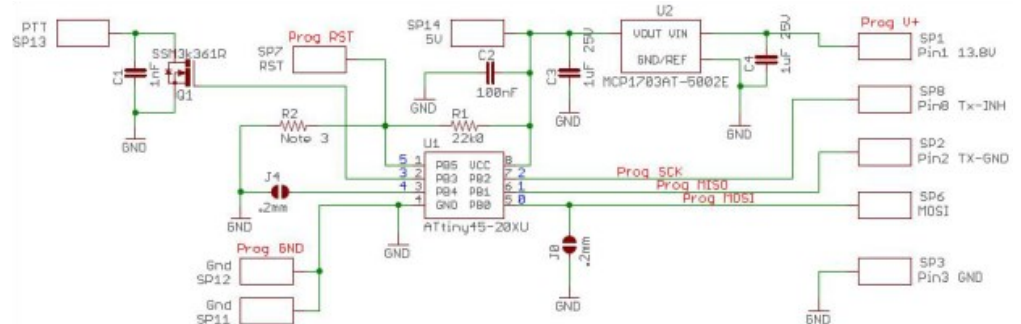
J0	J4	Hangtime (ms)
Open	Open	25
Short	Open	300
Open	Short	650
Short	Short	1000

Pin6 (PB1) connects to the ACC port's TX-GND pin (pin2) and is used to sense a request to transmit. The input is configured with its internal pull-up on so is high until the TX-GND pin is pulled low by the transceiver. Solder pads are provided on the PCB so that in circuit serial programming can be used to program the

processor. Separate documents are provided describing the wiring hook-up and programming procedure.

Firmware

The ATtiny uses the Arduino programming environment. Install a copy of the Arduino integrated design environment and load the sequencer ino file into it to follow along as you go through the firmware description.



Inputs

1. TX-GND on PB1 - senses a request to transmit high= key-up or Rx, low=key-down or Tx.
2. Jumpers J0 on PB0 and J4 on PB4 set hangtime during initialization
3. Analog voltage on PB5 is used to sense whether PTT is active high or active low. R2 (33k Ohms) must be installed for active high.

Outputs

1. PTT on PB3 - an open drain is used to indicate transmit or receive state to the connected transverter. If active low is selected high, or off = Rx; low, or on =Tx. Opposite is true if active high.
2. Tx-Inh on PB2 - inhibits RF output power from a connected transceiver when high,

Circuit
Schematic
version 2.2

and enables transmit power through the setup when low

Notes on Routines & Variables

1. The 'elapsedMillis' routine is used to allow input state changes to be monitored while the StartDelay or Hangtime is being counted in the background.
2. The variable 'StartDelay' is used to hold back RF power until the transverter has had time to safely switch from receive to transmit.
3. The variable 'Hangtime' is used to prevent the transverter from changing states from transmit back to receive in between Morse characters. Hangtime selected will depend on the user's code speed. A Hangtime of 25 ms is provided for digital or SSB work, and it is the 'default' i.e. both J0 and J4 are open.

Setup

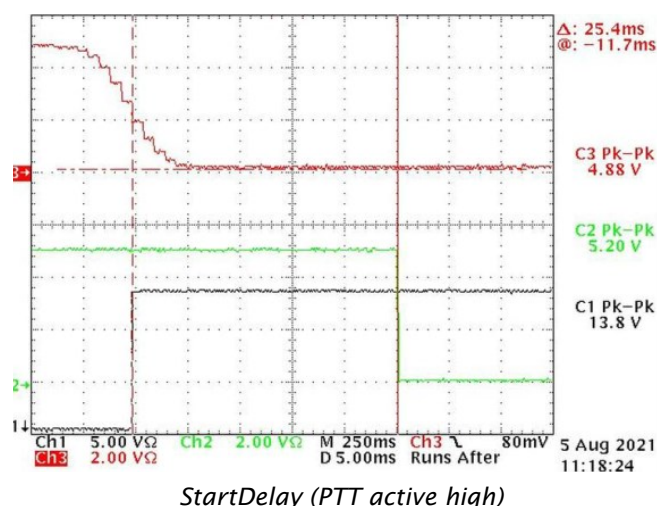
1. The voltage at PB5 is measured. If $\leq 3.5V$, but higher than digital LOW, R2 (33k Ohms) is installed so PTT transmit mode is set to active high otherwise the measured voltage without R2 will be at the supply voltage and the transmit mode will be set to active low. The PTTState is initialized.
2. Inputs PB0 and PB4 form a two bit word used to select the hangtime from four possible options. These digital inputs have their pull-ups enabled so if the jumpers attached to these inputs are open the input will be high, if soldered short to ground the input will read low. PB4 forms the MSB. A switch routine is used to select the hangtime.
3. To minimize current consumption after initialization, the internal pull-ups and the analog converter are turned off.

Loop

1. Tx-Gnd is monitored and the program loops until TxGnd goes (or is) low.

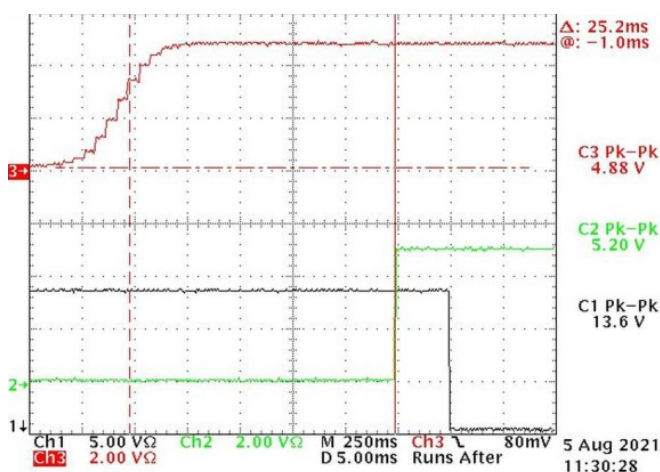
2. PTT is toggled and routine monitors for a TxGnd state change while waiting for the StartDelay to expire. If TxGnd changes before StartDelay expires the StartDelay timer is reset.
3. StartDelay expires (TxGnd has remained low for StartDelay), so TxInh is taken low to enable RF through the system
4. The firmware monitors Tx-Gnd for a state change to high, indicating request to transition from Tx to Rx (key-up).
5. When a Tx-Gnd high is sensed, the Hangtime counter is started.
6. If Tx-Gnd goes low during the hangtime (key-down sensed), the Hangtime counter is reset.
7. If Hangtime expires, TX-GND has been high for longer than the Hangtime, so TxInh is taken high, preventing RF from entering the system, then after a short delay, the PTT state is toggled into the receive state.
8. The firmware loops back to the beginning of the loop routine and waits for TX-GND to go low.

Timing Measurements



In the above scope trace records, trace 1 is the sequencer's PTT output, trace 2 the TxInh output to the ACC connector pin 8, and trace 3 is TxGnd input from the ACC connector pin2.

StartDelay is programmed to be 25ms. PTT is active high. The transceiver's TxGnd open collector output goes low indicating a request to transmit. PTT goes hi telling the transverter to set up for transmit mode, and TxInh delays RF output from the transceiver for 25 ms giving the transverter time to change state to transmit before RF is allowed through the system.

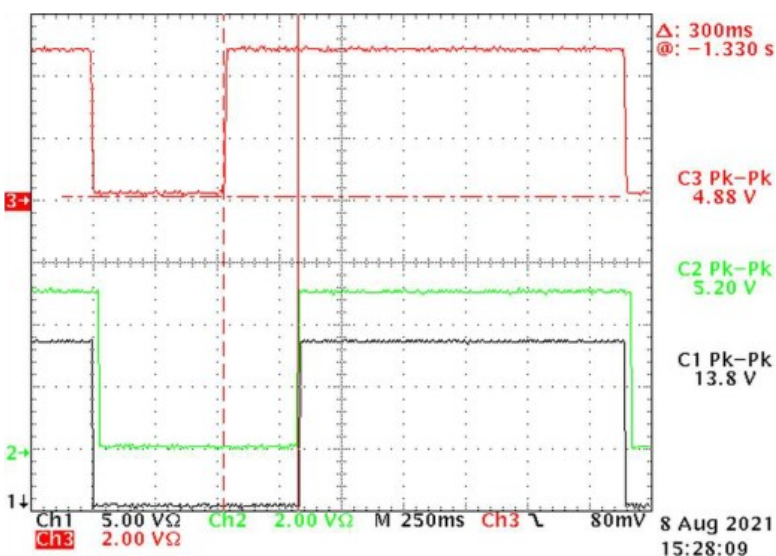


Hangtime Delay 25 ms (PTT active high)

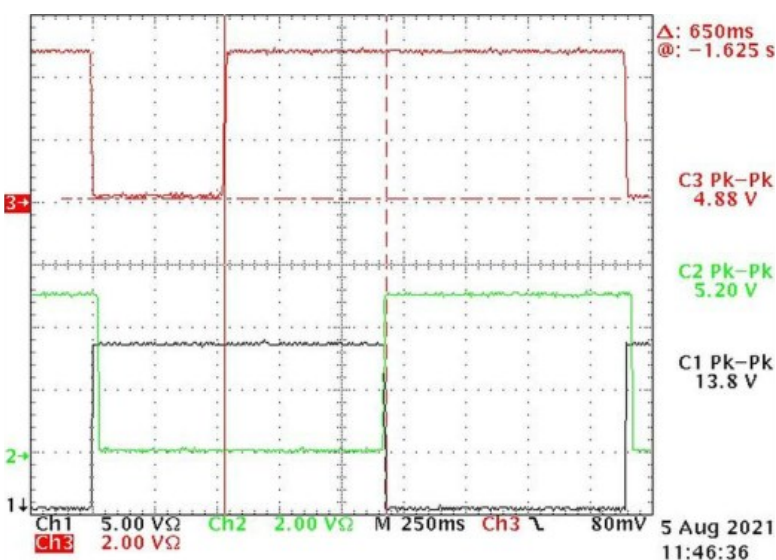
Hangtime delay is programmed to be 25ms. PTT is active high. The transceiver's TxGnd open collector output goes high indicating a request to return to the receive state. Hangtime delays the start of a transition to receive for 25 ms. At that time TxInh goes high disabling the transceivers RF output. A further delay of 5 ms is built into the system to insure that TxInh always inhibits RF before the transverter is allowed to switch state back to receive. After the further 5 ms delay, PTT goes low, allowing the transverter to switch to the receive state. The 5 ms delay is arbitrary. It insures that TxInh always precedes PTT to insure that there is no RF in the system when PTT commands the transverter to change state back to receive. If TxGnd is re-triggered

before TxInh goes high the Hangtime delay is extended until TxGnd once again goes low. If TxGnd is retriggered after TxInh goes high, a StartDelay is invoked. The 5 ms delay is the same for all Hangtime and therefore has the most impact with the 25 ms Hangtime making it 30 ms.

Hangtime can also be configured for 300,650, or 1000 ms.



300 ms Hangtime Delay (PTT active low)



650 ms Hangtime Delay (PTT active high)



Assembly Guidelines

Start by dry fitting the PCB in the Mini DIN connector. It's a tight fit and the PCB was Vcut so the edges are not as precise as routing would be. As a result the PCB may be just a bit longer and wider than desired. The PCB must NOT extend past the end of the metal shield surrounding the DIN connector.

Disassemble the 8 pin Mini Din connector. The Mini Din has 3 rows of pins, 2 pins in the first row (1, 2) and a second and third row of three pins (3, 4, 5, & 6, 7, 8).

Fit the PCB into the DIN connector pushing it all the way into the connector while aligning it carefully between the first two rows of pins with pins 1 and 2 to the PCB bottom and 3, 4, 5 to the PCB top.

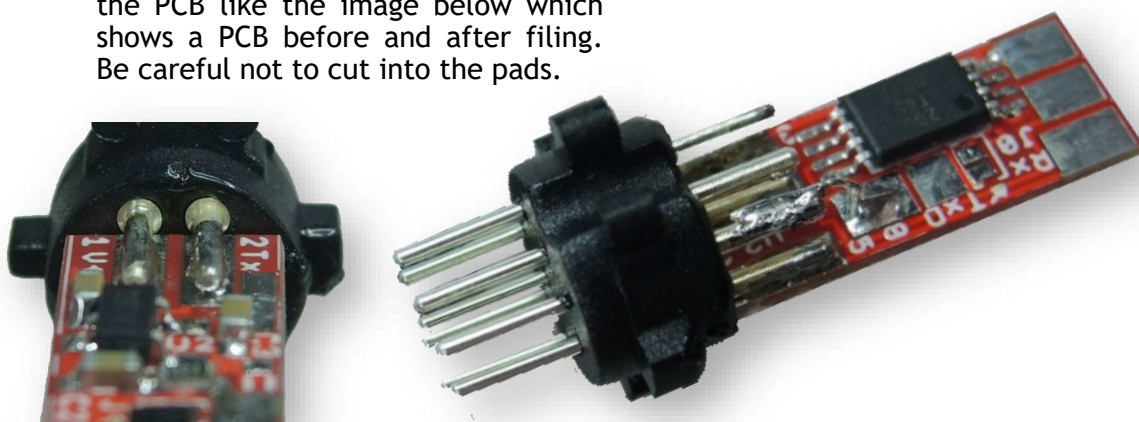
Place the metal shield around the PCB and check for clearances. If the board is too long or wide, file a bit off the PCB like the image below which shows a PCB before and after filing. Be careful not to cut into the pads.

Populate all the components on both sides of the PCB. As the PCB is small, there wasn't room to provide identification for all components on the silk screen, so use the PCB top and bottom layouts below to identify part locations. The PCB top side has three Mini DIN solder pads. The bottom has two.

Components are fairly tightly packed on this board, and when they share a common connection area solder pad like C2 and R1, soldering can be a bit tricky as the solder tends to spread into the adjacent component's pad area.

For best results solder the end of the component that abuts the already installed component first.

~ Wayne VE3CZO



Important Note

The assembly instructions are not included in this article, nor are additional diagrams. To download these documents, please go to:

<https://www.dropbox.com/s/7s73zk36wrfd1ms/Mini%20DIN%20Sequencer%20V2.2.zip?dl=0>



Measurements With The NanoVNA

Arie Kleingeld PA3A

Part 6—Measuring the input impedance

The 'sacred' 50 ohm value

Our coaxial cables are 50 ohms, our SWR meters work at 50 ohms, the nanoVNA works at 50 ohm, the antenna tuners convert everything to 50 ohms and so my receiver also has a input impedance of 50 ohms. But is that really so? Measuring it is a nice job for the nanoVNA. The measurement charts presented in this article were created with nanoSAVER.

Measurement challenges

Measuring an impedance with S11 R+jX is easy, and displaying the S11 SWR gives us a familiar insight about the adjustment to 50 ohms. My nanoVNA version H3.2 is signaling of -5dBm (S9 +68dB) in the HF range, but other VNAs can reach 0dBm (S9 +73dB or 1 milliwatts). The latter means a voltage with a peak value of more than 0.3V.

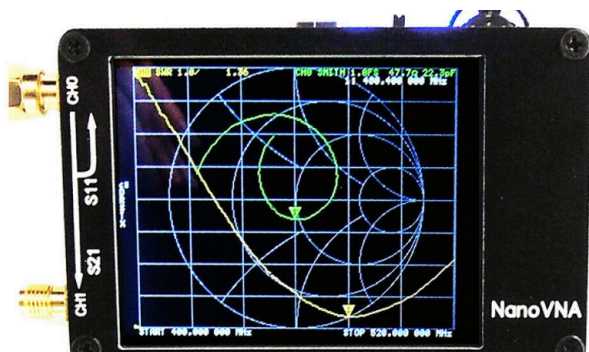
A possible The problem may then be that something unintentionally conducts or does not conduct (e.g. switching diodes). There is a chance that you will then measure just a different value than when you measure it with somewhat weaker values signals would say lower than the S9 +60dB maximum value of your S-meter. For example, you could attenuate the VNA signal by 10 or 20 dB. But can you with a attenuator between the nano and the receiver still correctly measure the input impedance? That's the question we answer first before connecting the nanoVNA to the input of the receiver.

Making an attenuator

I make the attenuators from the junk box. If you search for '50 ohm attenuator' there is a lot to find. From the many websites with attenuator documentation I choose the site of John MOUKD. He has collected several calculators on his site where resistance values are calculated for you for a desired attenuation. Nice to be able to use that. (<https://m0ukd.com/calculators/>)

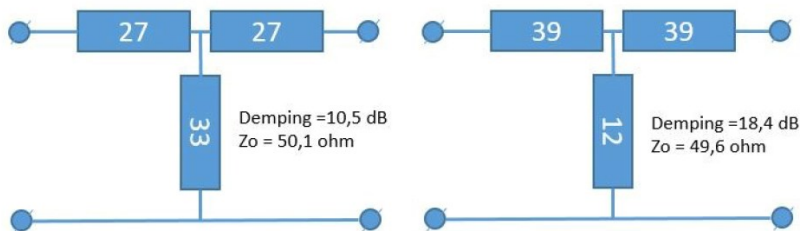
Which attenuator I make depends on the following four criteria:

1. Must be able to be made with only 3 standard resistors (from E-12 series)

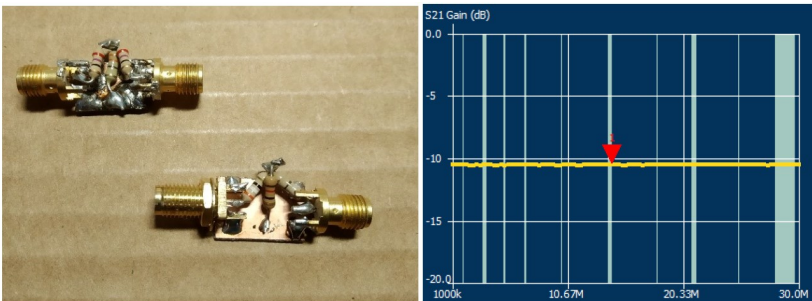


2. Characteristic impedance (Z_0) of the attenuator should be close to 50 ohms
3. Near 10dB and/or near 20dB attenuation
4. T-shape or PI-shape is not important

The following T-attenuators come pretty close, after some attempts at the attenuator calculator:



In practice, the attenuators look simple [see photo above]. Making attenuators for HF is easy and not critical. When measuring, the damping of both attenuators turned out to be correct, as an example see the S21 Gain of the 10.5 dB attenuator. The 18.4 dB attenuator was also spot-on.



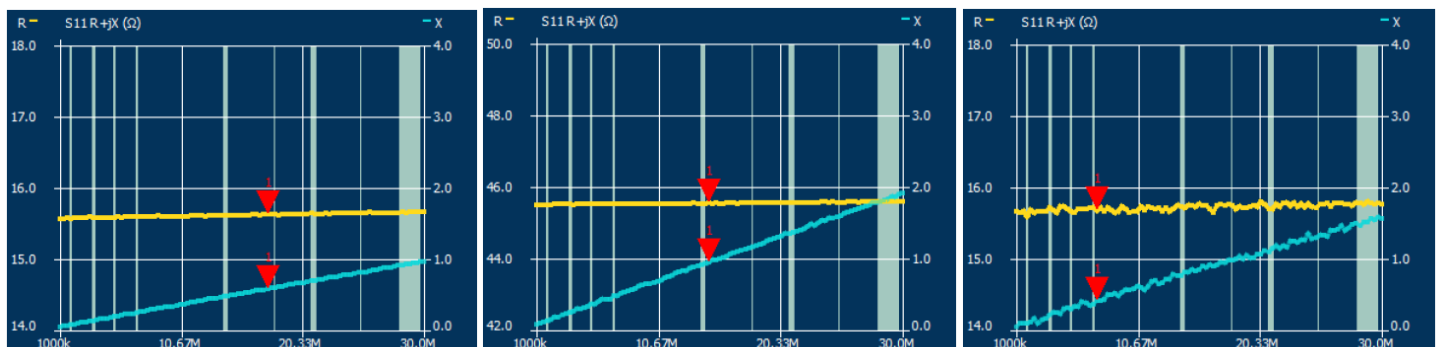
Measuring with the nanoVNA via the attenuators, the test

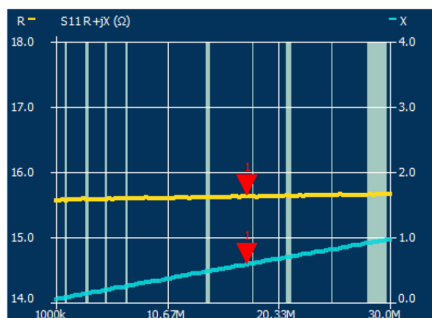
First we measure the S11 R+jX of an approximately 16 ohm resistor with the standard nanoVNA. The value turns out to be more than 15.5 ohms [see the graphs page bottom, left]. Without further fuss we then switch the 10dB attenuator in between and measure the 16 ohms again, and we get the middle graph. We see an incorrect value here (approx. 46 ohm).

Then we calibrate the nano in the usual way with the attenuator included in the chain. If we then measure the same 16 ohms again we get the graph on the lower right. We clearly see the 16 ohms returns. This is pretty much a copy of the left graph with no attenuator.

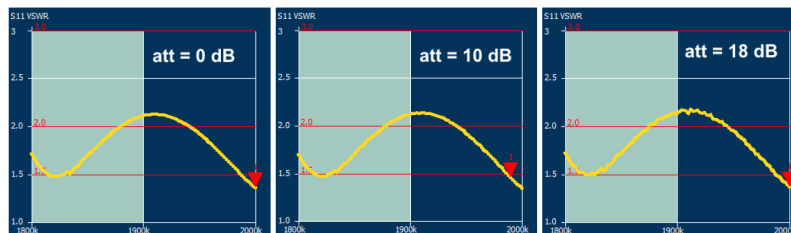
This is the power of the nano's calibration capability! Provided the attenuation is not too great, and you have recalibrated for the task, you can make a proper measurement. With a different load (e.g. 75 ohms), I could achieve the same result.

I also measured the 16 ohms through the 18dB attenuator. At the top left of the next page you will find the two measurements: first without the attenuator, and second with an 18dB attenuator and new calibration. We can see that the calibration for the 18dB attenuation is also neatly processed, but some noise has entered the measurement. But this is not really a problem.

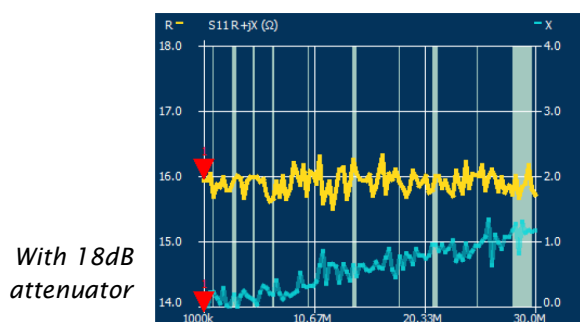




Left: No attenuator

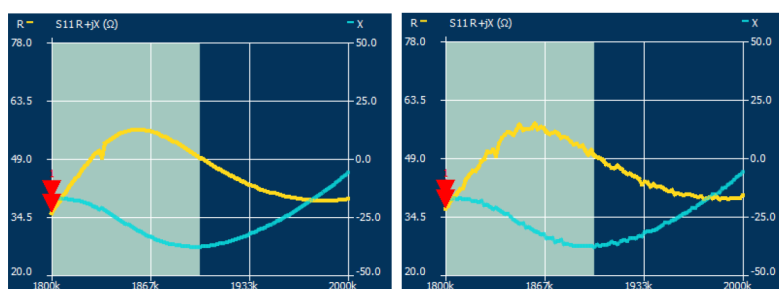


SWR curves



With 18dB attenuator

done with 0 dB attenuation [below left] and with 18 dB attenuation [below right].



0 and 18 dB attenuation

With this we have established that we can safely measure through the attenuators, provided the attenuation used is not too high.

Measuring the input impedance of a receiver

The receiver in use is an Elecraft K3. In this case I chose the SUB RX (2nd receiver) and tuned it to the 160m band. Measuring other bands is similar, with or without different impedance and SWR values. We measure S11 successively without the attenuator (att = 0 dB), with the 10dB attenuator (att = 10 dB) and with the 18dB attenuator (att = 18 dB). In all 3 cases, the nano was first calibrated.

First of all, the S11 SWR curves [shown top right], are best known to us radio amateurs. The receiver's SWR input at 160m turns out to be between 1.5 and 2. There is hardly any difference between the three measurements. Therefore, if we use an attenuator, we can properly measure in a practical application.

Next, we look at the S11 R+jX values to give a more in-depth picture. The measurements are

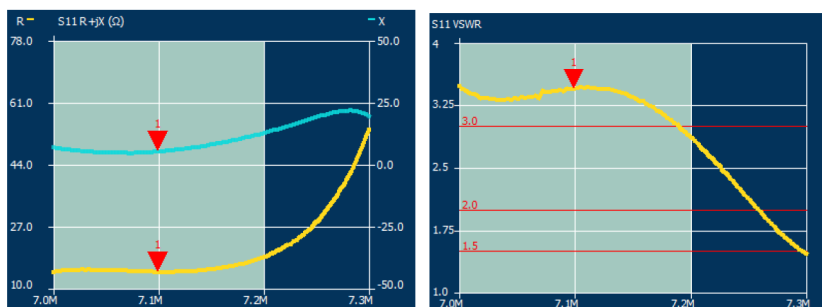
Here too we see that the measurements are equivalent, although in the case of the 18dB attenuator it is clear again that noise is seen on the measured values.

Conclusions

1. We see that we can confidently measure the K3 at the full capability of the nanoVNA. With or without attenuator produces the same results. With 10dB attenuation you can barely see the difference. We do see some noise in the measurements with the 18dB attenuation, but that is acceptable. So if you want to protect the input of the receiver, you can use an 18dB attenuator. The measured values will simply work if you have calibrated first. Using a higher attenuation will make the readings inaccurate. In my case, 25dB was too much for a good measurement.
2. At 160 meters, the K3's SUB RX is pretty close to 50 ohms, SWR between 1.5 and 2.

3. Calibration before measurement is *really* important. If the attenuator is not completely symmetrical, the measured values will vary if you connect the attenuator the wrong way around. Keep that in mind because it can make a lot of difference. Don't ask me how I know ;-)
4. On other amateur bands, a receiver input may behave differently.

To demonstrate point 4, I measured the S11 at 40m in the example below. The difference at 160m is clear. On the left the measurement S11 R+jX, on the right the S11 SWR.



In short, a receiver input of exactly 50 ohms is not an issue in my case. This can vary by band. If I went the royal road to connect my 75 ohm receiver antennas to the input of the SUBRX, then I should actually make an adjustment per band. That is something for the competitive contesters and purists.

The receiving antennas that I use here and there myself and that enter the shack with 75 ohm TV coax come without modification to the connected receiver. It turns out to be no problem in my specific situation.

You can also repeat these measurements yourself with your own receiver while, for example, you turn on the pre-amp or conversely turn on the attenuator. Maybe it will make a difference in input impedance for your transceiver.

Have fun measuring. Questions or remarks? Let me know. Contact details can be found on QRZ.

~ Arie Kleingeld PA3A

Online groups on NanoVNAs:

<https://groups.io/g/nanovna-users>

<https://groups.io/g/NanoVNAV2>

<https://groups.io/g/nanovna-f>

<https://groups.io/g/nanovna-f-v2>



Minimizing anxiety with your electric car

NanoVNA Article correction

In the article *Measurements with the nanoVNA Part 5: Measuring low impedances* in the July-August 2021 SARC Communicator, one of the formulas in Box 2 (calculate S21 with a parallel Z to $Z=R+jX$) was incorrect.

The correct formulas are presented here. A big thank-you goes out to Philippe Levionnais who saw the mistake in the original formulas and for pointing this out to me.

73,

~ Arie PA3A

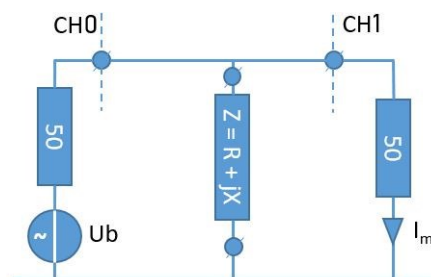
Box 2

$$S21 = Dr + j Di .$$

Dr and Di values are exported directly from nanoSAVER by

$$R = 25 * \frac{Dr(1 - Dr) - Di^2}{(1 - Dr)^2 + Di^2} \quad X = 25 * \frac{Di}{(1 - Dr)^2 + Di^2}$$

means of an **S2P** file. $R+jX$ can be calculated using the formulas below.



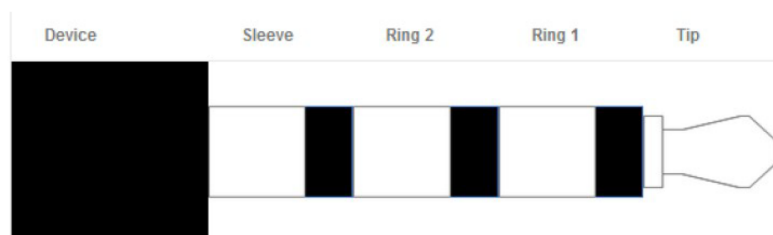
Are You Confused About Your A/V Cables?

Recently on the Boulder ATV net there was a discussion about the proper connections on 1/8" A/V plug cables. Jack, KOHEH, did some research and came up with some answers. I have added a few entries covering the specific devices we are using.

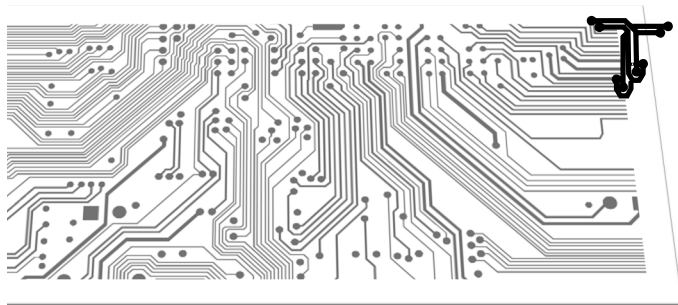
Note: For RCA plugs, the standard color code convention is: Yellow = Video, Red = Right Audio Channel, & White = Left Audio Channel

If you have an unknown cable, then use your Ohm-meter to determine which of the above you have.

~ Courtesy TV Repeaters REPEATER Newsletter



Device	Sleeve	Ring 2	Ring 1	Tip
Raspberry-Pi	Video	Ground	Right Audio	Left Audio
Apple	Video	Ground	Right Audio	Left Audio
MP3 Players	Ground	Video	Right Audio	Left Audio
Camcorders	Right Audio	Ground	Video	Left Audio
Canon Camcorders	Right Audio	Ground	Video	Left Audio
Media Player	Ground	Video	Left Audio	Right Audio
Hi-Des DVB-T Receivers	Ground	Video	Left Audio	Right Audio
RC-832 5.8GHz, FM-TV Receiver	Ground	Video	Audio	Not Used



TECH TOPICS

Rick K8CAV

The VOM-DVM workshop

Here at The Communicator we regularly receive newsletters from other organizations. One is the Portage County Amateur Radio Service (PCARS) who publish their informative newsletter, The RADIOGRAM monthly. PCCARS has invited us to reprint articles of interest and this one struck me as an excellent workshop to teach basic skills to members.—Ed.

On Saturday July 24th, the Portage County Amateur Radio Service (PCARS) held at VOM/DVM workshop at the club site. The purpose of the workshop was to introduce participants to the principles of the VOM (volt-ohm-ammeter) and DVM (digital volt-ohm-ammeter), and how to use them.

The workshop started with a presentation that covered a number of different topics. Safety was the first, and most important topic presented and talked about how to make measurements while minimizing the possibility of shock, injury, or damage to the instrument or circuit being measured. Each instrument was described along with listing their capabilities. Advantages and disadvantages of each instrument were presented and more in-depth discussion about things such as resolution and accuracy were presented. The concept of instrument impedance was discussed, and how an instrument's impedance

might affect presented measurements in circuits. Finally, the use of probes with instruments was talked about, and how such probes might expand the usefulness of the instruments.

When the presentation was complete, participants moved to a hands-on portion of the workshop. Six

stations were established that required each participant to make and record measurements at that station. Each station had a test setup, along with the required instruments, calculators and scratch pads. At some stations, participants were asked to make some basic calculations using Ohm's Law, using the measurements they made along with other given information to come up with answers to questions posed for that station. In all cases, participants needed to



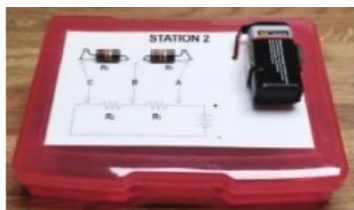
use the information they learned during the presentation to set their instrument to the correct mode and range to make the required



measurements both safely and to obtain the required accuracy and resolution for that station's purpose.

At **Station 1** participants were asked to make and record ten different DC voltages ranging from approximately nine volts to approximately ninety volts.

Station 2 required participants to measure and record, using three different instruments, a DC supply voltage across two resistors forming a voltage divider network, and also the voltage across one of the two resistors in the network. Possible explanations were asked for if there were different readings between instruments.



Station 3 participants were asked to measure the current in a circuit using an instrument, then to remove the instrument and measure the voltage and resistance in the circuit and use Ohm's law to calculate the current, and explain any differences. VOM-DVM Work Shop

Station 4 involved measuring the voltage produced by a solar cell into a given load to calculate the amount of power produced by the solar cell.

Station 5 participants measured the value of three resistors and calculated the difference



between the measured and nominal value of each resistor. They then calculated the percent of difference to determine if the resistors were in tolerance based on the color of the tolerance band on the resistor.

Station 6 was comprised of four precision, calibrated resistances and one precision, calibrated voltage. Participants measured the resistances and voltage, calculate the error in percent, and then compared the error to the specifications for the instrument to determine if the instrument met published specifications.



By the end of the workshop, all of the participants finished with a greater knowledge of the VOM and DVM, and were more fully able to use them to make measurements involving voltage, current, and resistance. Those who participated were Nick AC8QG, Ben AD8FQ, Agnus KE8LWP, Rick KD8WCK, Bob N8QE, and Mike KB8TUY.

~ Rick K8CAV

Courtesy of the Portage County
Amateur Radio Service newsletter
-The RADIOGRAM

<https://www.portcars.org/wp/newsletters/>





Ham Hardware

Al Duncan VE3RRD

A Boost/Buck DC-DC Converter for use with the KX3 or



I wanted to use my KX3 as a portable transceiver powered from whatever battery power was available to me. For the full output power of 10 to 12W, or to charge the internal batteries, a 13.8V (or slightly greater) supply is needed; so some means of converting voltages that are too low or too high is required.

<http://www.ebay.com/itm/Mini-DC-2-5-30V-Red-LED-Panel-Voltage-Meter-3-Digital-Display-Voltmeter-LS4G-/131051474424>

This voltmeter is powered by the voltage it is measuring, and operates over a range of 2.5 to 30VDC.



On eBay, I found several boost/buck converters that would work to supply a continuous 13.8V at 2.5 to 3A. The one I ordered can operate from any input voltage between 5 and 32VDC and can supply the required output at 3A continuous (5A peak).

<http://www.ebay.com/itm/DC-DC-Boost-Buck-Converter-5-32V-to-1-25-20V-5A-Power-Supply-Voltage-Regulator-/181516035122>



The finished converter allows me to use 6V, 12V or even 24V batteries to power my KX3.

I also ordered a compact DC voltmeter module to monitor the battery voltage so I would not discharge it too far and cause permanent damage.

A toggle switch allows the voltmeter to monitor either the input (battery) voltage, or the output voltage. The KX3 has a series diode in the power supply line, so I adjusted the converter output



voltage to obtain the desired voltage as displayed on my KX3. An output of 14.1V resulted in a displayed value of 13.9V on my KX3.

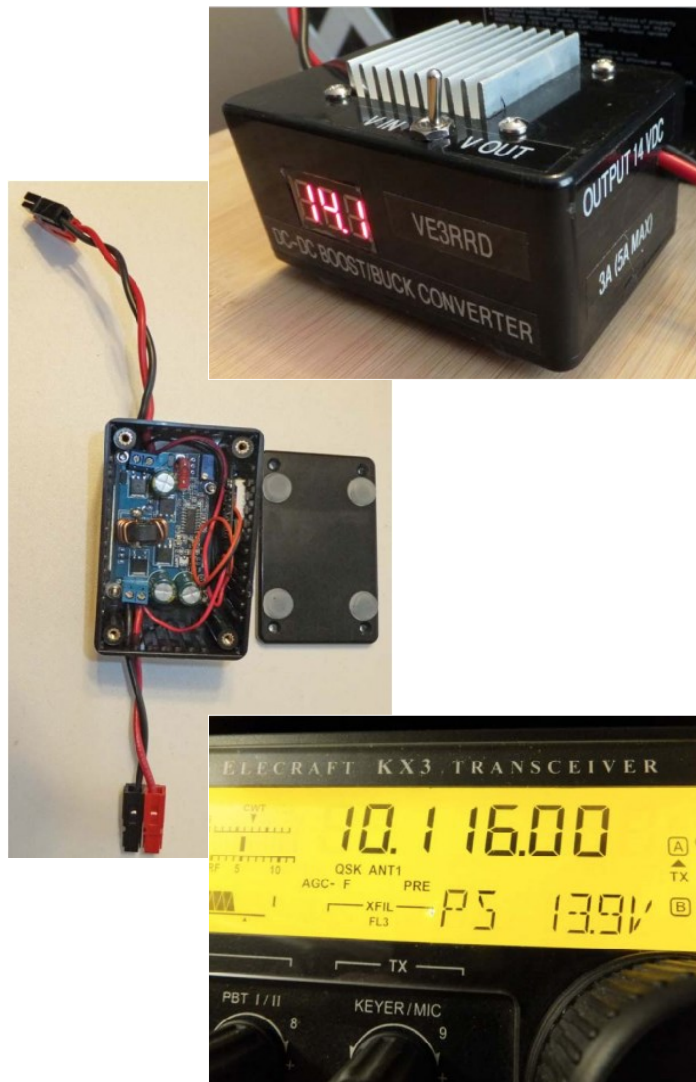
I used 18 AWG wire for both the input and output cabling to minimize voltage drop. At maximum output current and lower input voltages, the converter can draw as much as 8A intermittently from the battery.

Everything fits inside a Hammond 3.3 x 2.2 x 1.5 inch (1591LSBK) box. There is just enough room between the edge of the PCB and the wall of the box to fit the subminiature SPDT switch and the compact DVM board. The DVM is secured in its opening with a few drops of cement.

I monitor the battery (input) voltage while I am operating; as I mostly use 12V gel cell batteries (two 6V - 7AH in series), if I see the battery voltage drop much below 11.5 VDC during transmit, I will switch to a new set of batteries (or call it a day).

~ AL VE3RRD

Article reprinted with permission from the author.



Transporting a 5Mb (yes, 5 Megabyte) hard drive was a serious job back in 1956

British Columbia QSO Party 2021



Behind the Scenes

Contesting in with-COVID era

There is light at the end of the proverbial tunnel—the COVID-19 tunnel, that is—brighter in some places than in others but nonetheless an indicator that we will all get back to some semblance of normal soon. For ordinary folks, the pandemic will be remembered for inconveniences, for lockdowns and curfews and travel restrictions, and for limited access to friends and family. For anyone who was personally affected by COVID-19, the pandemic might be remembered as an uncomfortable time possibly tinged with sadness, too. My condolences to anyone who lost a loved one during this time, whether COVID-related or not. It was a difficult time to grieve.

The downsides of the pandemic get more attention, and not to trivialize the enormous consequences of the pandemic on just about everything that makes the world turn, but there were some upsides, too. Many people have had more time at home, and they've crossed off multiple items on the to-do list that had been left untouched for years and years. People with a hobby—maybe even a dormant hobby—finally had time to enjoy that hobby more fully.

Case in point—radio. And to be more precise, contesting. True, the usual weekend DXpeditions to islands in the Caribbean for the big contests didn't happen due to border closures and restrictions on international travel. But many of those weekend DXpeditioners were on the air from their home stations, so participation levels were still good, but DX content was down. Another noticeable trend in 2020 and at least until April 2021 and maybe through May as well was a tremendous increase in QSO party activity.

Part of the reason is surely because more people were stuck at home, and whether the event was a casual QSO party or a cutthroat international marathon contest, it was an enjoyable way to spend the afternoon or longer. The question then is, will QSO parties continue to draw large crowds, or will activity backtrack to pre-COVID levels once stay-at-home/stay-close-to-home recommendations are fully lifted? Will QSO party time be usurped by a honey-do list or family get-togethers? I'm thinking, hoping, that the newfound (refund?) fun of QSO parties sustains interest going forward.

BCQP 2021 participation WAY up

QSO party participation was also fueled by the State QSO Party Challenge, which includes the two parties in Canada—BCQP and the Ontario QSO Party.

There were a lot—a LOT—of operators, primarily in the United States, who were keen to begin the year-long competition with as many Qs as possible across the first three parties—BCQP, MNQP and VTQP. Having three parties on the same weekend helped keep operators engaged even when activity waned in the contest of focus, so the bands were buzzing, particularly on Saturday.

There was great depth to participation in BCQP 2021, with a few new BC callsigns in the mix and more operators spending hours upon hours calling “CQ BCQP” on both Saturday and Sunday. The results by BC stations reflect perseverance amid challenging CONDX. Operators who stayed the course had FUN! and kept the BCQP profile high.

Several times, I looked at the cluster, mostly to make sure that VA7ODX had not been busted. If it was listed as VE7 or DOX, I would have moved. I often saw several other BC stations above and below. Great stuff! Makes S&P a lot easier and more fun for everyone near and far. The CW operator saw the same. A terrific development.

CONDX

Rotten. Challenging. Discouraging. And yet, for operators who put in the time, the pileups were pretty constant.

CONDX on Saturday was better than on Sunday, and QSO counts reflect this. Based on the content in all logs received, the total number of QSOs reached 17,347, with 12,029 or 69.3%, on Saturday and 5,318 or 30.7% on Sunday. The Sunday segment is four hours shorter than the Saturday segment, but the difference between Saturday and Saturday is quite large regardless.

2021 highlights

The number-crunching section, beginning on page 10 of the full report at:

[\[http://orcadx.cc.org/content/pdf/bcqp/BCQP_2021_report.pdf\]](http://orcadx.cc.org/content/pdf/bcqp/BCQP_2021_report.pdf),

goes into considerable detail, but let me provide a few notable highlights that underscore the depth of participation in 2021.

- Number of logs received hit 363, up 131 or 55.8%, from 233 in 2020.
- Enormous increase in number of logs received from outside BC, up 110 or 54.1%, and an impressive improvement in the number of BC logs received, up 19, or 67.9%, to 47.
- Much higher number of BC stations on the air—up 54, to 135.
- Big rise in number of BC operators involved—up 48, to 144.
- More districts activated—35 of 42, for a coverage ratio of 83%.
- CW again the popular mode by far.

Interesting development, comes with caveat

On numerous occasions, as I was looking for a running frequency, I came across U.S. and Canadian stations outside BC calling “BCQP. Looking for BC stations.” A nice strategy. It does have a downside though—the outside-BC station often gets responses from other stations outside BC, which aren’t worth points—but it absolutely has an upside as well. BC operators who only do S&P will throw out a callsign.

Often, these S&P-type BC operators aren’t fully committed to BCQP. A few are, of course, but many aren’t. They hadn’t planned to participate in BCQP or weren’t aware of the event and are likely unprepared for the required BCQP exchange. If pressed for their federal electoral district, they may not know it, get it confused with the provincial riding or (gasp!) give out an incorrect district name.

Since BCQP's growing popularity may lead to more non-BC stations calling CQ, let me offer some suggestions on what to do.

Ideally—and repeat BCQP participants already know this—during the QSO, the CQing operator can guide the BC operator through the elections.ca website to find/confirm the federal electoral district and then check the BCQP multiplier list to get the three-letter abbreviation for BCQP purposes. Or, the CQing operator can do the search if the other operator provides a postal code. Confirming the district DURING the QSO ensures that the CQing station gets the correct exchange AND it ensures that the BC station will be giving out the correct district on subsequent Qs, because continued participation by an accidental participant is certainly a possibility.

Some CQing operators use QRZ post-BCQP to find an address and then plug the postal code into elections.ca to find the federal electoral district. This is problematic. For many reasons. First and foremost, it's not really the right thing to do in contesting. Aside from fixing obvious issues, especially in the log header (name, address, category of entry, name of QSO party!!, etc.), the log is what it is, mistakes (mis-entered callsigns, etc.) and all, when the contest ends.

But more specific to the unknown or iffy district issue, the BC operator who didn't know his/her district may realize several Qs later that the district given out earlier was wrong and switch to the right one. Our BCQP log-checking process will go with the correct district, and the incorrect district will relegate the QSO in the earlier CQing station's log to busted status. It's unfortunate and sometimes rather maddening, if the CQing operator was simply entering the info as provided. But these things happen.

Another problem arises when the callsign itself is busted, and the potential for a busted callsign rises exponentially when CONDX are rotten and/or operators are struggling with QRM, QRN and QSB and, on PH in particular, operators aren't using phonetics. Looking up a busted callsign on QRZ will result in a busted district designation. More often than not, a busted callsign is either a unique, not showing up in any other submitted logs, or is revealed as busted because the QSO appears in a reciprocal log with the CQing station's callsign. There's also always the possibility that the QRZ address is incomplete or the individual has moved or maybe s/he was operating from a location different to the QRZ-listed location. Consequently, the district remains a question mark, and will essentially invalidate the QSO.

Personally, I hate it when I've tried really hard to complete a QSO correctly, whether it's for a rather rare multiplier in a contest or an ATNO for my DXCC collection... and then it turns out I'm not in the log or the other operator has busted my callsign. So don't lose out on BCQP QSO points and/or mult. If you're CQing, do the best you can to get the correct information if you encounter a BC operator who doesn't know his/her district. Work together to figure it out BEFORE the QSO ends.

Phonetics on PH, please!

When CONDX is awful, when auroral creep makes over-the-pole Qs nearly impossible, when local QRM/QRN and QSB obliterate the same "question mark" again and again, when callsigns and exchanges are truly just whispers in the wind and it's more ESP than listening skills that put a callsign in the log... phonetics are oh-so important. This doesn't really apply to CW but on PH... essential. B can sound like P or even G. S like F. M like N. Well, a similar issue does occur with CW. A missed "dit" or "dah" is a completely different letter, isn't it? And when there are so many similar callsigns, phonetics boost accuracy and QSO efficiency.

Looking at BC stations in BCQP 2021, there was VA7ODX, VA7DX and VE7DX; and VA7RN and VA7RR; and VE7XFA, VE7XF and VE7UF; and VE7ES and VE7EU; and VA7VK and VA7VX; and VE7KW and VE7KX; and VA7OM and VA7MM; and VE7SAR and VE7JAR. Relying on a cluster spot or logging software database—in any contest, not just in BCQP—could lead to a busted callsign, incorrect multiplier and lost points. Some of the above-mentioned BC stations were CW-only or PH-only, but a few were mixed mode themselves or had QSOs with other stations that were mixed mode. It was obvious during the log-checking process that the similarity in callsigns caused some operators to mis-enter data beyond the typical “A” vs “E” in the prefix.

From outside BC, quite a number of callsigns differed only by a number or letter as well. Don’t over-rely on your logging software database and/or cluster spots.

Rewards for perseverance

BCQP offers many incentives for getting on the air, from the camaraderie of team operation—albeit socially distanced in 2021—and the chance to polish skills or help others learn about HF operation to potential pileups and surprise DX (for BC participants able to contact anyone anywhere).

For operators seeking tangible rewards, BCQP has lovely BC scenery- or notable landmark-inspired certificates and plaques, different every year and therefore collectible. Certificates recognize top scores by stations in BC and outside BC in all categories of entry by state, province and DX entity. A certificate category recognizing top score, overall, in each BC district is maintained to spur greater participation from operators throughout BC since VE7/VA7s are quite literally the life of the party.

Note: The only requirement for certificate and plaque eligibility is that the submitted log has at least 10 valid QSOs.

~ Rebecca VA7BEC

Contest Coordinator BCQP

Read the full report at:

[\[http://orcadxccc.org/content/pdf/bcqp/BCQP_2021_report.pdf\]](http://orcadxccc.org/content/pdf/bcqp/BCQP_2021_report.pdf)

Complete line scores are here:

BC: http://orcadxccc.org/content/pdf/bcqp/2021_BCQP_BC_scores.pdf

Outside BC: http://orcadxccc.org/content/pdf/bcqp/2021_BCQP_outside_BC_scores.pdf

Plaque Winners in 2021

Team VE7IO (+VA7QD VA7NF VA7TU VE7FO VE7TI VE7WJ) captured the Top BC (multi-op) plaque, with a score of 1,140,434.

Gary VA7RR broke the single-op record by a long shot, with a score of 1,734,000 to capture the Top BC (single-op) plaque.

VE7UF (OP: VE7JH) is awarded the mixed mode plaque, with a score of 1,221,872. Note: Plaque category renamed “Excellent Achievement: Mixed Mode.”

Les VA7OM takes the top CW plaque, with a score of 273,632.

Elizabeth VE7YL kept the Top YL plaque with a CW-only score of 10,964.

Axel KI6RRN held on to the Top US plaque, with a score of 26,916.

Dale CE2SV reclaimed the Top DX plaque, with a score of 5,716.

Allen VY1KX returned to top Canada outside BC position, with a score of 4,976.

Pete VE7CV will receive the plaque for districts contacted, renamed “Excellent Achievement: Districts Contacted.”

ORCA DXCC maintained top club status, with an aggregate score of 6,694,706 from 29 submitted logs with Orca DXCC as the participant’s affiliated club. Note: This does not include sponsor call VA7ODX results.



'Hamming' on the Computer

Block Windows driver updates for specific devices

I run a specific COM port driver on my Amateur Radio computer. It requires a driver from 2009. I often find that Windows updates the driver in a system update. When this happens, the COM port no longer works and I have to manually re-install the 2009 driver. Here is a solution...

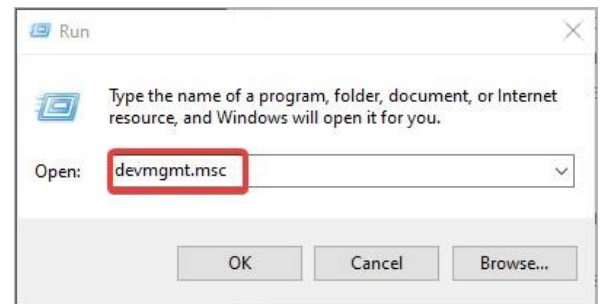
If you just want Windows 10 not to update drivers for some specific devices, you can use this method, which allows you to block driver updates for specific devices. To block driver updates for specific devices, only two steps are needed:

Step 1: Find the hardware IDs for the device

A hardware ID is a vendor-defined identification string that Windows uses to match a device. Almost all devices have a list of hardware IDs. To block driver updates for a specific device, you need to find the hardware IDs for the device.

Here's how to find the hardware IDs for a device:

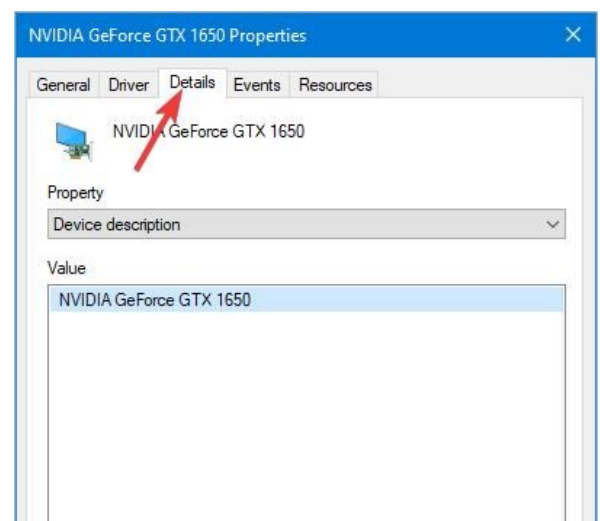
1. On your keyboard, press **Win+R** (the Windows logo key and the R key) at the same time to invoke the Run box.
2. Type *devmgmt.msc* in the Run box and click **OK** to open Device Manager.



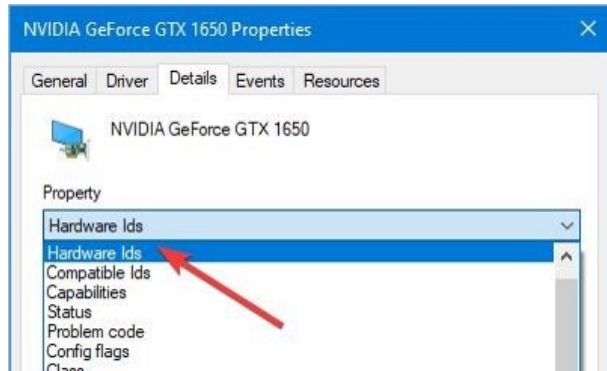
3. In Device Manager, find the device that you want to block the driver updates for.

4. **Double-click** on the device to open the device Properties.

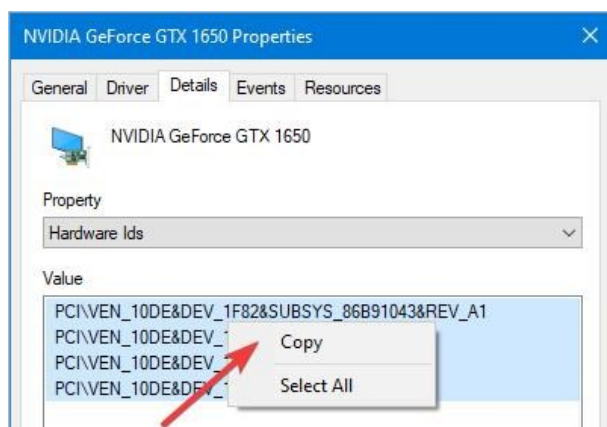
5. Select the **Details** tab.



6. Select **Hardware Ids** from the drop-down menu of Property.



7. Copy all hardware IDs from the **Value** section.



8. Create a text file and paste the hardware IDs to the text file. You can use Notepad.

If you need to block driver updates for multiple devices, repeat the above steps for each device. Then copy and paste the hardware IDs of the devices to the text file.

9. Save the text file.

Step 2: Prevent installation of devices that match any of these device IDs

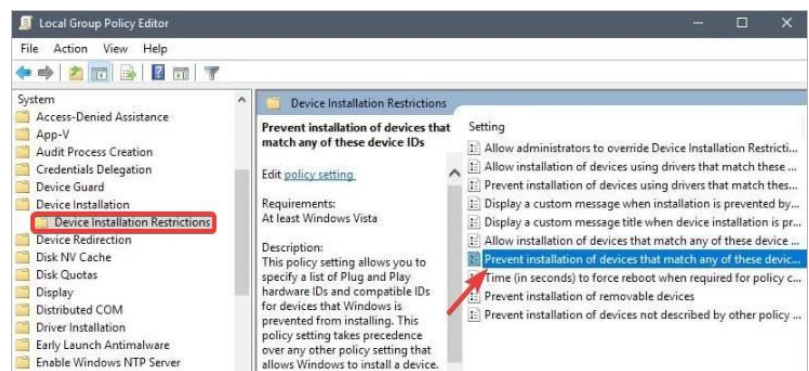
After you find the hardware IDs for the devices, open the Group Policy editor and configure the related settings to prevent installation of the device drivers. Follow the below steps:

1. On your keyboard, press **Win+R** (the Windows logo key and the R key) at the same time to invoke the Run box.

2. Type **gpedit.msc** in the Run box and click **OK** to open the Local Group Policy Editor.

Open Group Policy...

3. Expand **Computer Configuration > Administrative Templates > System > Device Installation**, and click **Device Installation Restrictions**. On the right panel, double-click on **Prevent installation of devices that match any of these devices IDs**.



5. Select **Enabled** and click the **Show** button to open the Show Contents window.

6. In the Show Contents window, **copy and paste all hardware IDs** you've saved earlier to the Value section. Then click **OK** to save the changes.

7. Back on the policy page, click **OK** to save the changes.

If you want to prevent driver updates for other specific devices in the future, you can keep adding the hardware IDs of those devices to the Value section mentioned in Step 6. But you need to keep the Enabled option (mentioned in Step 5) selected.

~ Windows Tips



VE7SL's Radio Notebook

Steve McDonald VE7SL

Matching transformer for “loop on ground” and Beverage antennas

*This is a companion piece to the post:
“Hearing through the noise on the low bands”.*

As man-made noise levels become ever more problematic for radio amateurs, particularly those that are serious about weak-signal DX on the lower bands (160 / 80m), the ‘Loop On Ground’ or ‘LOG’ is proving to be a worthwhile improvement for some.

Bud, VA7ST, near Kelowna, BC, has done some recent experimenting with a LOG as an alternative to listening with his 160 / 80m transmitting antennas and has written a great blog on his findings. Bud has included some ‘A-B’ tests comparing the LOG to his normally-used vertical or inverted-L and the results are quite interesting.

If you’ve ever considered building a separate quieter low-band antenna, you can find everything you might need to get motivated as well as a nice listing of LOG-related links in Bud’s very helpful blog post:

Why bother?

After years of thinking about it, in early 2021 I finally got serious about building some proper matching transformers for my short Beverage wire antenna along the property line and a loop on the ground laying on the back lawn.

Over the years I have puttered around with a short Beverage — about 280 feet of wire along a fence line and down into the wooded area of our lot, running due east-west.

In “experimenting” mode (my default mode, unfortunately) I fed the short Beverage with a simple, hastily wound matching transformer then alligator-clipped the leads to the antenna wire and a ground rod on the antenna side, and to 75-ohm RG6 coax on the radio side.

It worked, but the experimental nature of the construction was substandard as it was never intended for longer-term use. Over time, things deteriorated to the point that the Beverage was no longer in service. I wasn’t all that serious about low-band performance as I had enough on my plate building a station for the higher HF bands.

I’m back to being keen about contest scores on the low bands. Perhaps more important for me, I have DXCC on the higher bands so finishing DXCC on 160M would give me nine bands completed. As of this writing, I have stalled at just 25 DXCC entities on Top Band, mostly due to my inability to hear DX.

Reproduced with the author’s permission, Visit The VE7SL Radio Notebook at: [The VE7SL Radio Notebook](#) and Steve’s blog at [VE7SL - Steve - Amateur Radio Blog](#)

From the West Coast of North America, being able to hear and work Europe occasionally would be a game-changer.

Audio recordings

Before we get into the nuts and bolts of the receive antenna transformer boxes, let's see what the end result sounds like.

These recordings are made on an Icom IC-7610 – they start with the loop-on-ground antenna then switch to an 80M vertical. You'll notice the difference in noise – it jumps up with the vertical and drops out with the loop on ground, dramatically improving the signal-to-noise ratio of the signal.

In a contest or DXing, this can make the difference between working them and not making a contact.

[80M CW – TI5/N3KS | Feb. 1, 2021 – 0152Z](#)

[80M CW – KN6EIF | Feb. 1, 2021 – 0149Z](#)

[80M CW – W6 unidentified | Feb. 1, 2021 – 0143Z](#)

I made two recordings during the CW 160M CW contest on January 30. These are the low-noise loop on ground, and a much noisier inverted-L antenna. Clearly, the loop on ground isn't as good on 160M as it is on 80M, but it's still very useful:

[160M CW – K0UK | Jan. 30, 2021](#)

[160M CW – KV0Q | Jan. 30, 2021](#)

About the loop on ground pattern

I should note that the experimental loop on ground's "peanut-shaped" pattern is oriented with its main lobes pointed due north and south. The 80M recordings are of stations located in California and Costa Rica due south of me, so they're in the main lobe.

The 160M signals are from Colorado (W0-land), so they are in the east-side null of the antenna, hence the somewhat reduced performance.

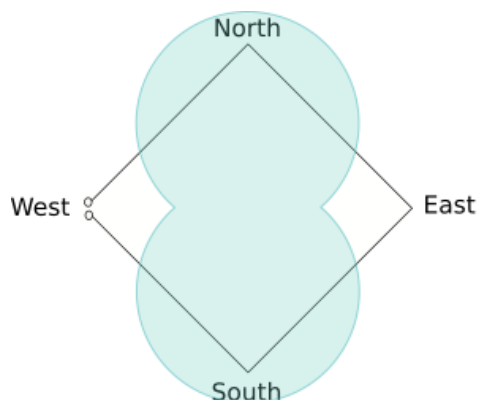
Handy resources

Before I started building the receive antenna matching transformers, I spent hours reading everything I could find on the topic of low-noise receiving antennas – what antennas to use and how to feed them, what kind of ferrite core to use, what kind of wire, how many turns to match the antenna impedance to 50-ohm or 75-ohm coax, and so on.

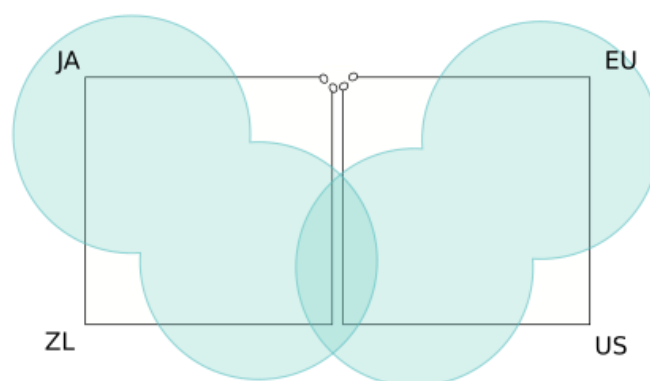
No sense reinventing anything here. I've compiled a list of some handy resources



Below: Here's the layout of the existing antenna, and the future double-wide version that will be switchable to cover most of the horizon, using a single matching transformer and a DPDT relay.



Loop on Ground -- test layout



Double-wide layout

that helped me decide what I need to try for my installation.

- [The Loop on Ground or “LoG”](#)
(a great primer by Matt KK5JY)
- [Loop on ground for RX](#)
(a transformer study by Owen Duffy)
- [Measuring the impedance of a loop](#)
(a great QRZ.com thread)
- [How to make a great 9:1 RX transformer](#) (by Gary Breed K9AY)
- [W8JI treatise on Beverage antennas](#) (indispensable wisdom)
- [On-ground low-noise receive antennas](#) (QST April 1988 article by Doug DeMaw W1FB (sk))

Eventually, I ended up with the following recipe for making the matching transformers now in use at VA7ST.

The goal: matching antenna to feedline

In this case, our objective is to construct a receive antenna matching transformer suitable for single-wire Beverages, Beverages on ground, and loops on the ground.

Typically, we'll be trying to match the impedance (Z) of the antenna – say, 450 or 500 ohms – to the characteristic impedance of our feedline coax – say, 50 or 75 ohms.

While a receive antenna that works well on several bands is nice, the matching transformer should be purpose-built for the band of greatest interest.

For me, the target is 160M so I want the best possible match from a 75-ohm cable to a 450-ohm antenna at 1.8 Mhz.

Gathering the bits and pieces

The matching transformer box consists of five components, and for ease of access I decided to see if I could acquire everything from the junk box or order it online (we have virtually nothing available from local suppliers here).

I almost succeeded – the little project boxes, binding posts and magnet wire were easily found on Amazon, and the ferrite cores were ordered from Digi-Key, but you can also order them from Mouser or Amidon Associates (links below).

Components List

- **Small plastic project box**
- **Two binding posts** – you can also use bolts and wingnuts, which I would consider if doing this again
- **One female F-type (cable TV) chassis-mount socket.** I “harvested” five of these from an old cable TV four-way amplifier that was in the junk box.
- **One 73-material binocular core ferrite** (Amidon #BN-73-202 or Fair-Rite #2873000202).

These are under \$1 each, plus shipping. I ordered 25 of them from Digi-Key (US\$0.43 each when ordering 25), so have a lifetime supply. They arrived the next day, shipped from the US warehouse to my home in Canada. Amazing service!

Sources:

[Digi-Key](#) | [Mouser](#) | [Amidon Associates](#)

- **#30 (or #28) enameled magnet wire** or equivalent – three feet is plenty. In one of my transformers, I used #30 insulated wirewrap wire from the junk box, which from a durability and ease-of-handling perspective, I prefer over enameled magnet wire.

Putting it all together

There's nothing magical about assembly. I drilled a 3/8-inch hole on one side of the box for the F-type female coax connector, and two 1/4-inch holes on the other side of the box for the binding posts.

Then I wound the actual matching transformer. In my case, I wanted to match 450 ohms (high-Z side at the antenna) to 75 ohms (low-Z side at the coax connector).

Measuring with an antenna analyzer I started with a turns ratio of 2 turns : 6 turns. That got me close. Then I tried 3 turns : 9 turns, and that was a little too much – so I removed one turn on the high-Z side, for a **3 turn: 8 turn** model that matches 450 ohms to 75 ohms at 160M (1.8 Mhz).

I made notes of the transformer measurements as I adjusted the turn counts. Here are the low-Z “coax side” readings, using a test load of 450 ohms:

WINDING

RATIO	160M	80M	40M
2 : 6 turns	76.5	94.5	148.5
3 : 9 turns	60.8	54.0	38.3
3 : 8 turns	74.3	69.8	54.0

Above: Table 1- Impedance matching measurements into 450-ohm test load

Once you’re happy with the transformer, just make the soldering connections. Small wire diameters make the job a little touchy, but with good lighting — and a magnifier if you have one — you will get it done.

Now, as I often say when finished with a build, run out and hook it up then run back to the radio and see how it works!

Measuring at the receiver

In the tables and graph you can see, antenna impedance varies by band and so does the matching transformer’s characteristics. The best you can aim for is getting it close for one band, and anything beyond that is “gravy.”

In the graph, in real-world practice, here’s how things look at the radio in the shack (using about 50 feet of RG6 to get from the loop-on-ground antenna on the back lawn).

Next step for me: move the short Beverage wire (currently about 5 feet off the ground) onto the ground — making a “Beverage on ground” to see if it performs any better than the minimalist length for an in-the-air Beverage.

I will post audio recordings of that antenna once the changes have been made in the spring.

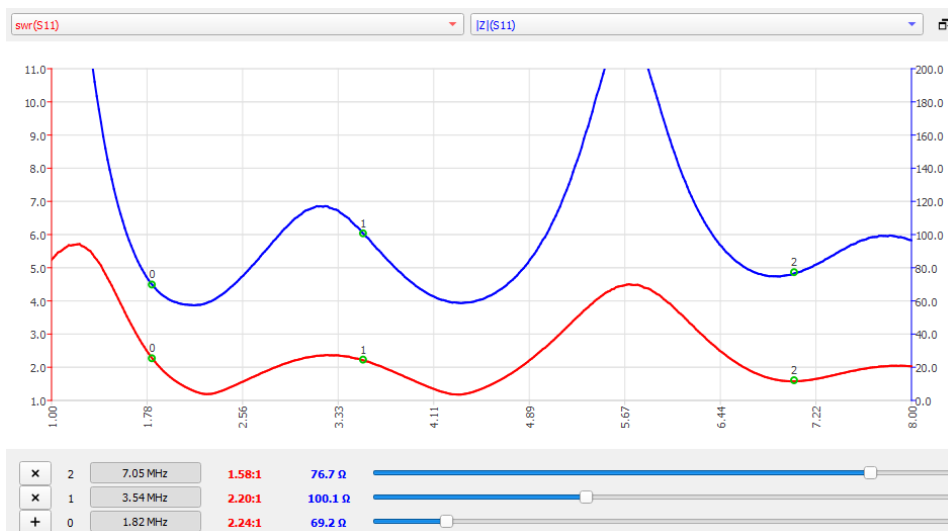
~ See [Matching transformer for “Loop on ground” and Beverage antennas / VA7ST.ca](#)



Above: The first iteration of the transformer — a 2:6 turn version.

3 turns : 8 turns measured in the shack	160m	80m	40m
SWR	2.24:1	2.20:1	1.58:1
Impedance (Z)	69.2	100.1	76.7

Table 2 - Real-world measurement at the radio
— Loop on Ground antenna



News From Clubs

July 14, 2021

Maple Ridge Amateur Radio Club

The Maple Ridge Amateur Radio Club is deeply saddened by news that our fellow club member Nick Gaudioso VE7TE passed. Nick had recently suffered from a battle with cancer.

For many years, Nick was the main organizer of the club's top fundraiser, the twice-yearly swap meet. He was the point of contact with all those purchasing tables, and usually handed out prizes to all winners. His energy was very apparent in the planning of that event. Anyone attending a club swap meet will probably know him as he was often the face of them. Nick also spent considerable time maintaining the club's repeaters.

Several years ago, Nick was awarded with a plaque recognizing his 30 years of dedicated service to the club. He was also voted a life member of the club, further recognizing his dedication. In the hours following notification of his passing, many club members gave moving statements on his character:

"Nick was a respected and cherished member of our club. An Elmer to both prospective and seasoned hams alike, active with both the repeater coordination council and provincial emergency program, and key to countless, successful swap meets, Nick was known throughout the hobby far

and wide. His sage advice and warm smile will be dearly missed. I'm truly honoured to have known and called Nick a friend"

"I met Nick on our first year here in Canada and he was my examiner when I took my exam back in 2019. He was also the one who introduced me to the group. So sorry to hear of his passing. Condolences and prayers to the family and may he rest in peace."

"Nick was a respected long term club member and my friend. He will be missed."

"Nick was a fine fellow. Always with a welcoming smile and a kind word to share. He will be missed."

Nick's funeral was held on Wednesday, July 21st, 11 A.M. at St. Luke's Parish, 20285 Dewdney Trunk Road, Maple Ridge, BC.

The club and Nick's fellow Amateurs wish to extend our sympathies to Nick's family and sincerely thank him for his many years of tremendous service to the club. It is a sentiment that the ham radio community will loudly echo. 73 to you, Nick, you will be sorely missed.

~ MRARC



Cooler Raspberry Pi amateur radio projects in 2021

Hands down, the Raspberry Pi is an amazing open-source device. Technology hobbyists implement it in many projects from sending instant messages to making retro video games. Now, it's being used for projects for a hobby that may be unfamiliar to some: amateur (ham) radio.

Worldwide, there are around three million ham radio operators, often referred to as hams. They communicate over designated radio waves using two-way radios, homemade equipment, antennas, repeaters, the internet, and even via satellites orbiting the earth.

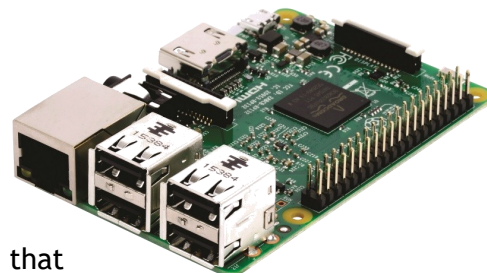
Recently, many ham radio operators have been incorporating Raspberry Pis into their projects. This is because these little single-board computers (SBC) have many benefits, including being easy to implement and portable - eliminating the need for heavy, stationary, and expensive equipment.

Thanks to something called software-defined radio (SDR), computers and SBCs can be used for radio communications.

In this piece, we talk about 10 cool ham radio projects that use the Raspberry Pi. It should be mentioned that if you plan on making some of these projects, you'll need to follow your local radio laws, especially when transmitting over the airways. It might also be a great benefit for you to get a ham radio license through the Amateur Radio Relay League (ARRL). This way you can use the designated frequencies dedicated to ham radio operators.

You can read more at <https://all3dp.com/2/amateur-pi-raspberry-pi-ham-radio-internet-radio/>

~ Southgate



Hi John,

Thanks for the article about the battery-based power supply [[The Communicator July-August 2021](#)]. I also prefer to run my projects from batteries, with one of the main reasons being that I don't have to take time to figure out a way to plug a power cord into a wall socket.

I'm concerned that you might have missed one of the alternative solutions - LiFePO4. For the same Ah, they're about half the mass and less than 50% more cost (USD\$60 + consumption tax for 16 Ah delivered in USA) relative to AGM, and more of their capacity is actually usable.

Cheers

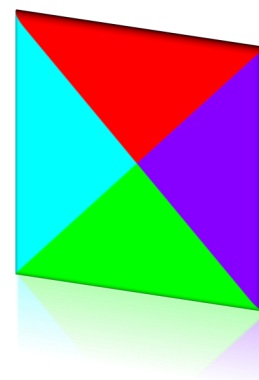
Halden VE7UTS



Foundations Of Amateur Radio

Onno Benschop
VK6FLAB

*What Open Source means to our hobby
and why it's important*



*To listen to the
podcast, visit the
website:*

*<http://podcasts.vk6flab.com/>. You can also use
your podcast tool of
choice and search for
my callsign, VK6FLAB.*

*Full instructions on
how to listen are here:
<https://podcasts.vk6flab.com/about/help>*

For much of the past month I've been attempting to articulate what Open Source Software is, why it's important, how it's relevant to our hobby, how it works, how software is different from hardware and why you should consider if the equipment you buy comes with source code or not. I'm finding it difficult to separate out the issues since they all hang together in a cohesive clump of ideas and concepts.

So, let me go sideways to set the scene.

There is a movement that asserts the right to repair our own things and to ensure that manuals and diagnostic tools used by manufacturers are made available to the public.

For many radio amateurs that might sound quaint and obvious, since for much of the hobby that kind of information was not only available, it was expected and assumed to be available. You can get the circuit diagram and testing procedures, the

alignment process and the list of required test equipment for most if not all amateur transceivers today and truth be told, if that testing gear isn't available, we tend to build or scrounge our own.

Compare a Yaesu FT-857d and an Icom IC-7300. They're radios from different generations, use different technologies, are made by different manufacturers and come in different packaging.

Both radios have user manuals, circuit diagrams and documented testing and alignment processes, but they're not equivalent even if they look the same.

The 857 is constructed from discrete components and circuits. There's a microprocessor on-board, the source code is not available and updates are issued by the manufacturer if and when it sees fit. Its function is to control and sequence things, selecting band filters, switching modes, updating the display and

control serial communications. While integral to the functioning of the radio, the microprocessor itself is used for command and control only.

Inside the 7300 you'll also find discrete components. There are circuits, filters and the like and while individual components have reduced in size there are many of the same kinds of functions inside the radio as you'll find on an 857. The microprocessor inside the 7300 is more advanced than the one inside the 857. The source code is also not available and updates are issued by the manufacturer when it sees fit.

If that was all there was to it, I would not have spent a month attempting to capture this. Suffice to say that looks are deceiving.

The microprocessor inside the 7300 does the exact same things as the 857 with one minor difference. It now also forms part of the signal input and output chain of the radio itself.

Let me say that again.

The computer that is the heart of a modern radio is an integral part of the signal processing of the radio. Where in a traditional radio the microprocessor was switching circuits on and off to process the signal, the modern solution is to do all the signal processing using software inside the microprocessor itself. If you want to get technical, an FPGA is doing much of the signal processing, but that too is driven by software.

Where previously you had access to the circuit diagram that would show you what was being done to the signal, today you have a magic black box that does stuff completely outside your control.

If you want to know how an SSB or FM signal is decoded on the 857, the service manual will helpfully point you at two chips which provide those specific functions. It describes

how the signal comes into the chip and how the signal is processed once it leaves the chip and if you need more, you can look online to find the specifications for each chip to see precisely what they do and how they work, complete with equivalent circuits and specifications.

On the other hand if you wanted to know the same information for the 7300 you'd be out of luck because if you dig deep enough, following the signal path, eventually you'd end up inside the microprocessor where software is making that happen. There's no description on how this works, what the circuit equivalent characteristics are, there's no way to change how it works, no way to set parameters, no way to see inside and no way to experiment.

This is a problem because it means that you've got a solution that's no longer operating in the spirit of amateur radio. It's not open for experimentation, it's not subject to review, there's no way to test, no means to improve, no way to do anything other than what the manufacturer decided was appropriate.

For example, if I wanted to modify the FM pass-band width on an 857, I could update the FM demodulation circuit by replacing a couple of components. On a 7300, I could not because there is no circuit. The FM demodulator is described in software that I don't have access to and Icom has decided that the FM pass-band is fixed.

If the software was open however, I could add this function and make it available to anyone who would like to experiment.

At this point I'd also like to observe that the Icom user manual states that inside the IC-7300 it uses open source "CMSIS-RTOS RTX", "zlib" and "libpng" software, so Icom is benefiting from open source efforts, but not sharing their own.

All podcast transcripts are collated and edited in an annual volume which you can find by searching for my callsign on your local Amazon store, or visit my author page: <http://amazon.com/author/owh>. Volume 7 is out now.

Feel free to get in touch directly via email: cq@vk6flab.com, follow on twitter: [@vk6flab](https://twitter.com/vk6flab) or check the website for more: <http://vk6flab.com/>

If you'd like to join a weekly net for new and returning amateurs, check out the details at <http://ftroop.vk6flab.com/>, the net runs every week on Saturday, from 00:00 to 01:00 UTC on Echolink, IRLP, ALLStar Link, IRN and 2m/70cm FM via various repeaters.

If you'd like to participate in discussion about the podcast or about amateur radio, you can visit the Facebook group: <https://www.facebook.com/groups/foundations.itmaze>

This podcast episode was produced by Onno (VK6FLAB). You can find more at <http://vk6flab.com/>

This is not an Icom only problem, this is a specific issue around open source versus closed source and while you might think that the right to repair and open source is something that's not relevant to you, I'd like to invite you to consider what the

implications are for our hobby. Are we going to go down the road of button pushers, or are we continuing our role as inventors and experimenters?

~ I'm Onno VK6FLAB

What mode is that?

The hobby of amateur radio is about communication. When you go on-air and make noise, you initiate a communications channel, sending information out into the world and hoping for another station to receive and decode what you sent. The channel itself can be used in an infinite number of ways and each one is called a modulation mode, or mode for short. The popular ones come with most radios, CW, AM, SSB and FM.

Those few are not the only ones available. In fact as computers are being integrated into the radio at an increasing pace, signal processing is becoming part and parcel of the definition of a mode and new modes are being introduced at break neck speed. I've talked about WSPR as an example of one such mode, but there are many, each with their own particular take on how to get information between two stations.

As you listen on the bands you'll increasingly find yourself hearing a bewildering litany of beeps,

pops and clicks. Some of those are due to ionospheric conditions, but many are different modes that are being experimented with across our spectrum.

If you have access to a band scope, a way of visualising radio spectrum, you can actually see the shapes and patterns of such signals over time and getting to that point can be as easy as feeding your radio audio into your computer and launching a copy of fldigi or WSJT-X.

Every mode requires a specific tool to decode it and with practice you'll discover that there is often a particular look or sound associated with a mode. Over time you'll confidently select the correct decoder,



using your brain for the process of signal identification.

Of course if you don't have access to the library in your brain yet, since you've only just started, or if the mode you've come across is new, you'll need another library to discover what you found. There is such a library, the Signal Identification Wiki. It's a web-site that hosts a list of submitted signals, grouped by usage type, including one for our community.

On the amateur radio page of the Signal Identification Wiki there are over 70 different modes listed, complete with a description, an audio file and a spectrogram. With that you can begin to match what you've discovered on your radio to what the web-site has in the library and determine if you can decode the incoming information.

I will mention at this point that the Signal Identification Wiki is far from complete. For example, the Olivia mode has 40 so-called sub-modes of which about 8 are in common use. Each of those sub-modes looks and sounds different. The wiki shows only a single line for Olivia.

I'm pointing this out because the wiki allows you to submit a mode for others to use. If you have a signal, either by recording it off-air, or better still, recording it directly from the source, consider submitting it to the wiki so others can benefit from your experience.

If you've come across a signal and you cannot figure out what it is, there are other places you can go for help. The four and a half thousand members of the /r/signalidentification sub on reddit will happily look at and listen to your signal and try to help. Make sure you contribute some meta data like the time, frequency and location to accompany the spectrogram and audio.

You might have come to this point wondering why I'm encouraging you to use and contribute to the wiki and ask for help on reddit. Amateur radio is about experimentation. We love to do that and as we make signal processing easier and easier, more people are making new modes to play with.

The speed at which this is happening is increasing and as an operator you can expect to come across new signals. I remember not that long ago, it was last month, tuning to an FT8 frequency and the person I was with asking what that sound was. They'd heard it before but never discovered its purpose, even though FT8 has been with us since the 29th of June 2017.

What interesting signals have you come across and how did you go with decoding them?

~ I'm Onno VK6FLAB

To: nanovna-users@groups.io Something that might be of interest is that the Surrey Amateur Radio Club, VE7SAR, has a wonderful newsletter that comes out bi-monthly. The newsletter is usually around 110 pages. The last several issues have had articles titled, Measurements with the NanoVNA". The Nov - Dec 2020 article deals specifically with "Establishing the Characteristics of Unknown Toroids".

Gary - W6GVS
Dowagiac, MI

Follow Up

KB6NU's Column

Dan Romanchik, KB6NU

Predictions call for solar cycle 25 to be big, early



A new solar cycle 25 forecast predicts that the cycle will be big, while a second predicts that it will be early.

Southgate ARC reports:

NASA Heliophysicists have released a revised prediction for Solar Cycle 25. The report generated by Ricky Egeland, a solar physicist working in the NASA Space Radiation Analysis Group now calls for the peak of Solar Cycle 25 to top out at a value of 195 ± 17 based upon the new scale for calculating Smoothed Sun Spot Number. For reference Solar Cycle 21 peaked at an SSN 233 (new scale) while Solarcycle 23 peaked at an SSN of 180 (new scale). If this predictions holds up

When he's not trying to figure out which way current flows, Dan blogs about amateur radio at KB6NU.com, teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com.

Ham Radio will see Excellent Worldwide F Layer Conditions on 10 Meters for several years around Solar Max. 6 Meters conditions should be good in the Equinox Periods before and after Solar Max with consistent openings on Medium Haul Polar Routes. 6 Meter routes traversing the equator should experience consistent openings ± 9 months from Solar Max.

That sounds pretty good, doesn't it?

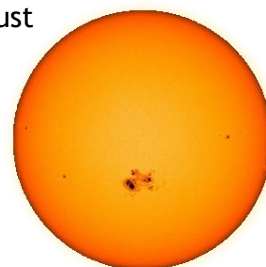
The second report appears on SpaceWeather.Com:

SOLAR MAX MIGHT COME A YEAR EARLY: Solar Cycle 25 is heating up faster than expected. The latest sign may be found in sunspot counts from July 2021. Continuing a trend that started last year, they overperform the official forecast:

Issued by the NOAA/NASA Solar Cycle 25 Prediction Panel in 2019, the official forecast calls for Solar Cycle 25 to peak in July 2025. However, a better fit to current data shows Solar Cycle 25 peaking in October 2024. This is just outside the 8-month error bars of the Panel's forecast.

Predictions like these really have little practical use for amateur radio operators. We all know that propagation will get better as we get into Cycle 25, and there's nothing that we can do to make it better. I suppose that if you have been thinking of putting up some kind of directial antenna—I've been thinking about putting up a hex beam—this information might spur you to do it sooner, rather than later. For the most part, though, we just have to go with the flow.

~ Dan KB6NU



No-Ham Recipes

Paulette VE7VPE



Butter Tart Squares

The flavours of these squares are perfectly balanced, the filling rich and smooth, punctuated by little chunks of walnuts.

Base

- 1 cup (250 ml) all-purpose flour
- ¼ cup (65 ml) granulated sugar
- ½ cup (125 ml) butter

Topping

- 2 tablespoons (30 ml) butter, melted
- 2 eggs
- 1 cup (250 ml) brown sugar
- 2 tablespoons (30 ml) flour
- ½ tablespoon (7.5 ml) baking powder
- ½ teaspoon (5 ml) vanilla extract
- Pinch of salt
- 1 cup (250 ml) raisins (soaked in just-boiled water to plump them)
- ½ cup (125 ml) walnuts, chopped coarsely

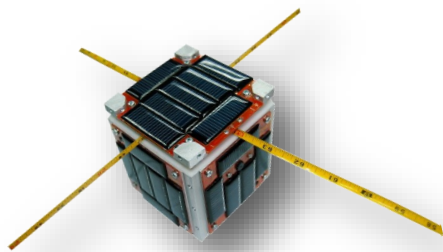


Preheat oven to 350F (180C or a very moderate oven)

BASE - In a bowl, combine flour and sugar; cut in butter until crumbly. Press into 9-inch square cake pan; bake for 15 minutes.

TOPPING - In a bowl, mix together butter and eggs; blend in sugar, flour, baking powder, vanilla and salt. Stir in raisins and walnuts; pour over base. Bake for 20 to 25 minutes or until top springs back when touched lightly. Let cool on wire rack before cutting into small squares.

~



Satellite News

You Can Do This...

SSTV from the International Space Station

As reported in the ARRL Space Bulletin ARLS007, from June 21-26, 2021, the ISS planned to host a SSTV special event. Information provided by ARISS (<https://ARISS.org>) indicated transmissions would be on 145.8 MHz FM using PD120 (2 minutes per image). Twelve different images were to be broadcast more or less continuously during that period. As a relatively new ham (since August 2020), this looked like a fun opportunity to try something new. To get started, I looked up the ISS overpass times for my QTH grid square (DN70JA, at: <https://amsat.org/track/>) on 6/22, and tuned my rig to 145.8 MHz, just to listen for the signals during a predicted overpass.

The first couple minutes after the AOS (acquisition of signal) time given by the tracker yielded only static. Then, faintly, I could hear the unmistakable “diddle” sound of an SSTV transmission preamble followed by the melodic chirp of an image being transmitted (an example can be found at: <https://soundcloud.com/spacecomms/pd120-sstv-test-recording>). Disappointment instantly turned to excitement, and I resolved to attempt to capture the entire image series, if I could.

My receiving station consisted of a Yaesu FT-991A set to FM mode, with a 16kHz bandwidth, fed by a Diamond X-50 vertical antenna on the roof of my shack, with the

audio signal fed via USB to a Windows 7 PC running MMSSTV software (<https://hamsoft.ca/pages/mmsstv.php>).

MMSSTV and the PC provided demodulation and image capture (the MMSSTV AFC should be engaged to compensate for Doppler shifts due to the high relative ISS velocity). Between 6/23/21 1624Z and 6/26/21 1856Z, 21 full or partial images were captured with picture quality P0-P5, and 10 of the 12-image-set were captured with ~P4 quality or better. Several images were captured multiple times, but not all images in the set were seen. The first image captured exhibited a herringbone interference pattern (see Fig. 1) due to locally generated RF noise.

In an attempt to understand parameters that most affected image quality, an Excel spread sheet was used to log each image time along with the corresponding ISS maximum line-of-sight (LOS) elevation and maximum elevation azimuth angles. A linear interpolation in time was used to approximate the actual maximum elevation angle from my station to the ISS at the time corresponding to the center of each image. The images were then graded on a quality scale from P0 to P5

(see <https://kh6htv.files.wordpress.com/2021/02/an-55a-atv-handbook-1.pdf> for details),

The latter being a perfect central image and the former being some indication of a transmission but no discernable picture. The quality ratings were plotted against the corresponding elevation and azimuth angles. There was no discernable relationship to the azimuth at maximum elevation, but higher central image ISS LOS path elevation angles largely corresponded to the higher P4 and P5 image quality factors as shown in Figure 3.

It is not clear why there are short duration dropouts in otherwise strong signals with a clear LOS (as can be seen in Figure 2). My antenna is vertically polarized and omnidirectional, so perhaps polarization variations or multipath reflections from the nearby foothills are involved. In either case, antenna improvements should address the issue. On one occasion, there was a strong signal, but the image was torn as though horizontal sync could not be achieved, and no signals were received at all on 6/25, presumably because none were transmitted during overpasses of my QTH. In any event, this was a toughly enjoyable exercise, and I look forward to future ISS SSTV special events.

~ Chris Grund, K0CJG,
Boulder, Colorado

Article reprinted with permission from the Television Club TV Repeater's
REPEATER Newsletter
July 2021, 2ed edition, issue #82

Figure 2: Examples of "P5" SSTV image captures from the ISS.
Left: 6/26/21 1223 Z; Right: 6/24/21 1849 Z.

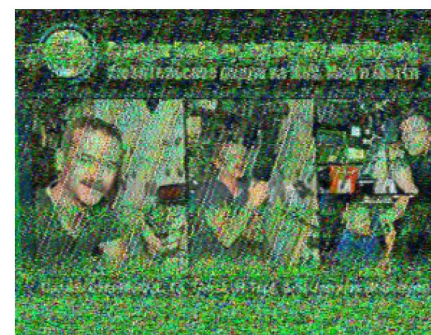


Figure 1. 6/23/21 1624 Z: Strong S6 SSTV signal, but radiated noise from two HDMI switchers operating in the shack caused copious herringbone interference. Once the sources were located, they were disconnected during all subsequent captures.

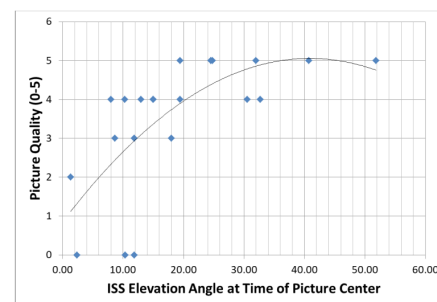
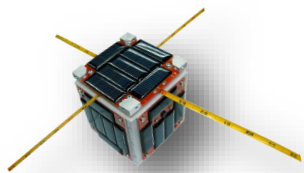


Fig. 3 Picture Quality vs. Elevation Angle

Figure 3 Picture Quality vs. Elevation Angle



AO-109 transponder available for use by efficient modes like FT4

AMSAT has announced the transponder on the amateur satellite AO-109 (Fox-1E) is available for use by efficient modes such as FT4 or CW

A statement on the AMSAT website says:

The AMSAT Engineering and Operations Teams are pleased to announce that AO-109 (RadFxSat-2/AMSAT Fox-1E) is now open for amateur use. Users are advised to use efficient modes such as CW or FT4 for making contacts, since issues with the satellite make SSB voice contacts challenging at best.

Please see the May/June 2021 issue (Vol. 44, No. 3) of The AMSAT Journal for an article by Burns Fisher, WB1FJ, and Mark Hammond, N8MH, detailing the various attempts to characterize AO-109 and its apparent problems.

On behalf of the Engineering and Operations Teams,

~ Jerry NØJY and Drew KØ4MA

AO-109 Frequencies

- Inverting Linear Transponder
- Uplink 145.860 MHz - 145.890 MHz
- Downlink 435.760 MHz - 435.790 MHz
- 1k2 BPSK Telemetry 435.750 MHz (non-operational)

Source: AMSAT

<https://www.amsat.org/ao-109-radfxsat-2-amsat-fox-1e-open-for-amateur-use/>

Breakfast is served, as captured by this recent photo.

Join us at Denny's 6850 King George Blvd, Surrey on Saturday mornings between 07:30-09:30



Ham Leftovers...

Credit card chip crystal radio

Perhaps the simplest radio one can build is the crystal radio. Using a diode as a detector, the design generally uses less than 10 components and no battery, getting its power to run from the radio signal itself. [Billy Cheung] decided to build a crystal radio using a rather unconventional detector - the smart chip in a common credit card: https://youtu.be/_z3KmFqtPXQ and the GitHub page: [GitHub - cheungbx/circular-credit-card-radio](https://github.com/cheungbx/circular-credit-card-radio)

The History of Single Sideband

Single sideband modulation revolutionized electronic communication, but where did the idea come from?

Antique Wireless Association Curator Emeritus Ed Gable, K2MP, tells the surprising story of single sideband, its origins, the developers, companies and the hardware that brought it to the forefront of wireless communication.

This presentation is the first of the AWA's monthly "AWA Shares" series: <https://youtu.be/BBRntPJTr5Y>

Another effect of climate change?

Alex VE7DXW reports, "Scientists from Israel determined that the rise in temperature has a detrimental effect on the ionosphere." This may explain why radio propagation is far lower than it was in the early days of Ham Radio. Read the paper here: <https://phys.org/news/2013-07-radio-news-climate.html>

Amateur radio tower: Judge says Framingham zoning board of appeals 'erred'

A judge overturned a ZBA decision and ruled a magnificent 80-foot high amateur radio tower can be erected in the City of Framingham. Read the full story: <https://framinghamsource.com/index.php/2021/07/13/judge-says-zba-erred-amateur-radio-tower-can-be-erected-in-framingham/>

Morse code used by police

The Indian Express newspaper reports Police in Pune are keeping Morse code as a robust stand-by communications mode: <https://indianexpress.com/article/cities/pune/pune-police-morse-code-satellite-7412482/>

Back to Basics

John Schouten VE7TI

From The Canadian Basic Question Bank

All about tones



Tones... we all know what they are in non-radio terms, but they pose questioning glances from many Basic course students. When we explain tones during the course. Referring to our hobby, tones may be:

- PL, CTCSS or sub-audible tones;
- A report of CW signal quality; or
- A tone used by repeaters to mark the end of a transmission.

PL, CTCSS and sub-audible tones

Let's look at a typical question:

B-2-1-5 What is a CTCSS tone?

- A. A special signal used for radio control of model craft
- B. A sub-audible tone that activates a receiver audio output when present
- C. A tone used by repeaters to mark the end of a transmission
- D. A special signal used for telemetry between amateur space stations and Earth stations

In telecommunications, Continuous Tone-Coded Squelch System or CTCSS is one type of in-band signaling that is used to reduce the annoyance of listening to other users on a shared two-way radio communications channel. It is sometimes referred to as tone squelch. It does this by adding a low frequency audio tone to the voice. Where more than one group of users is on the same radio frequency. CTCSS circuitry mutes those users who are using a different CTCSS tone or no CTCSS.

All users with different CTCSS tones on the same channel are still transmitting on the identical radio frequency, and their transmissions interfere with each other; however; the interference is masked under most (but not all) conditions. The CTCSS feature also does not offer any security.

A receiver with just a carrier or noise squelch does not suppress any sufficiently strong signal; in CTCSS mode it unmutes only when the signal also carries the correct sub-audible audio tone. The tones are not actually below the range of human hearing, but are poorly reproduced by most communications-grade speakers and in any event are usually filtered out before



being sent to the speaker or headphone.

A receiver equipped with a CTCSS decoder will not reproduce a signal unless it carries a given sub-audible tone in the background, for example a continuous 100 Hz tone. To work with such receivers, a transmitter must be equipped with a CTCSS encoder. Standard tones are in the range of 67 to 254 Hz, below the normal speech frequencies of 300 to 3000 Hz.

One example of the purpose for repeater tones is here in the Greater Vancouver area of SW Canada. We operate VE7RSC in Surrey on a repeater frequency of 147.36 MHz. About 65 miles south, on Camano Island in Washington State, W7PIG operates on the same repeater frequency pair. Without tones, under ideal propagation, we hear their repeater and they hear ours, in most instances it is poor copy and distorted, so it is classed as interference. By using a different tone on each repeater, only stations on our frequency *with* our sub-audible tone programmed open up our repeater. The repeater will not respond if no tone, or the incorrect tone is detected. The same situation occurs on Camano Island and that repeater uses a different tone as its 'key'.

Bear in mind that if both repeaters are in use there is still activity on one frequency by both users. Therefore the disadvantage of using CTCSS in shared frequencies is that users cannot hear transmissions from other groups. They may erroneously assume that the frequency is idle and then transmit at the same time as another user, thus interfering with the other group's transmissions. In our example, the distance is sufficient that there is little objectionable co-use and it is much more tolerable than not using tones.

Tones are not only used on repeaters. Many newer transceivers allow the user to program in a sub-audible tone when you wish to only hear simplex transmissions from other users in your group. Such use may be during an event or an outdoors recreational activity.

CTCSS is an analog system. A later Digital-Coded Squelch (DCS) system was developed by Motorola under the trademarked name Digital Private Line (PL).

Many radios also have a feature typically labelled '**Tone Squelch**'. That is similar to a repeater CTCSS tone but you can program it into your transceiver receive. When enabled, and the transmitting radio sends that sub-audible tone with the audio, your receive is unmuted only when that tone

Refer to your user manual... The tone setting is usually indicated on your transceiver display by the letter 'T', while Tone Squelch may display as 'T-SQL'.



is received with an incoming signal. This feature may be handy if you are with a group of Amateurs and only wish to hear the conversation when one of the group is transmitting.

Therefore, the correct answer to the question in **B-2-1-5 What is a CTCSS tone?** is

B. A sub-audible tone that activates a receiver audio output when present

Next...

DTMF Tones

Dual-tone multi-frequency signaling (DTMF) is a telecommunication signaling system using the voice-frequency band over telephone lines between telephone equipment and other communications devices and switching centers. DTMF was first developed in the Bell System in the United States, and became known under the trademark Touch-Tone for use in push-button telephones supplied to telephone customers, starting in 1963. DTMF is standardized as ITU-T Recommendation Q.23.

In Amateur Radio, DTMF is enabled with a keypad on the transceiver or microphone. DTMF uses a mixture of two pure tone (pure sine wave) sounds, a set of eight audio frequencies transmitted in pairs to represent 16 signals, represented by the ten digits, the letters A to D, and the symbols # and *. As the signals are audible tones in the voice frequency range, they can be transmitted and heard through repeaters and amplifiers, and over radio and microwave links.

DTMF is commonly used to turn on a link via radio, such as may be needed to contact a station on IRLP or EchoLink. It was also heavily used before cellular

phones became common, as hams could dial telephone calls via their radio using a 'phone patch' on a repeater. Some repeaters and clubs still offer this service.

Tones and signal reports

B-2-6-2 What does "RST" mean in a signal report?

- A. Readability, signal speed, tempo
- B. Readability, signal strength, tone
- C. Recovery, signal strength, tempo
- D. Recovery, signal speed, tone

"RST", A short way to describe signal reception (Readability: 1 to 5, Signal Strength: 1 to 9, Tone Quality (for Morse): 1 to 9). For example, "11" unreadable, barely perceptible. "33" difficult to read, weak signal. "45" readable, fairly good. "57" perfectly readable, moderately strong.

The 'T' in RST is only used for CW (Morse code) reports and is a indication by the receiver of the quality of the received tone.

Therefore, the correct answer to the question in **B-2-6-2 What does "RST" mean in a signal report?** is:

B. Readability, signal strength, tone

And finally...

Repeater courtesy tone

There are no questions in the Canadian Basic Amateur Radio exam question bank about courtesy tones but the term is listed as an incorrect answer. Regardless, you should be aware of its meaning.

Most repeaters have a courtesy tone just before the transmitter stops transmitting. This is typically a 'bee-boop' sound.



The ones that do not will have a squelch tail that will transmit for a second or so after the input carrier or tone drops.

After the courtesy tone or carrier drops, if there is no courtesy tone, you should wait a second or two before keying up the mic. This provides space for others to break in if needed.

The courtesy tone is merely an audible indication that the repeater has finished transmitting and another station may start.

Kerchunking

While we're on the subject, let's also mention 'kerchunking'.

This is one of the most annoying things for a repeater operator and people that listen to the repeater a lot.

Just in case you do not what Kerchunking is... Kerchunking is when you press the PTT and then let off without any speaking.

Some people will kerchunk the repeater but never talk. If you kerchunk the repeater to get it to wake up and ID before starting a new net or QSO that is fine because you follow up the kerchunk with your callsign and start a net or QSO.

Some people think that kerchunking the repeater is a way to test your radio but it really is not a valid test, as you have passed no audio.

In Canada, the rules state that you must ID at the beginning and end of a conversation and at least every 30 minutes (10 minutes in the United States) if your conversation lasts that long. Just a Kerchunk (or many) does not meet the regulations

Bottom line, do not kerchunk the repeater and not ID.

The 'Alligator'

"The alligator bit you" is a term you may hear when on the air.

This is a slang term for the timer function of a repeater controller that limits the length of time the transmitter will remain keyed without a pause. Typically the timer is set between 3 and 5 minutes.

It is a protection device to prevent the repeater from overheating when transmitting. Aside from so-called "Long-winded operators", I have seen instances where repeater users have accidentally sat on their mics and transmitted for some time without realizing it (when you are transmitting you do not hear other users or the repeater because your receiver is muted). If the time-out timer did not exist the repeater power amplifier would overheat causing an expensive repair.

Such times are not unique to repeaters. There is a very good chance that the transceiver you own also has protective circuitry to limit transmitting time.

~ John VE7TI

Calling all New Amateurs: Get your Name in Lights!

Did you get your Amateur Radio certificate within the past year or two and want to introduce yourself through TCA to the Amateur Radio community? If so we would love to hear from you.

Drop a line to tcamag@yahoo.ca and tell us how you were introduced to the magic of Amateur Radio.

Do you credit any particular Amateur ("Elmer") with getting you started? Which aspect of the hobby do you enjoy so far?

Please be sure to include your name, call sign, date and level of certificate – and don't forget to include a photo or two. We hope to hear from you soon!



Do you need more information about our courses?

<https://bit.ly/SARCCourses> or scan the QR-code with your smart-device camera

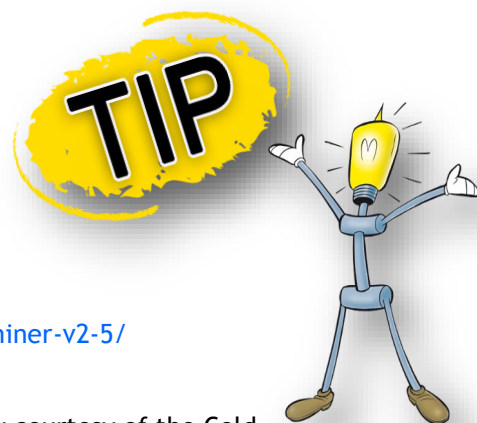
Study Links for more information

Whether you are new to the hobby or brushing up on skills, you should find these study links helpful:

1. RIC-7 is the entire up-to-date Industry Canada (IC) Basic Question Bank.
<http://tinyurl.com/CanadaBasicQB>
2. Industry Canada (ISED) on-line practice page:
https://apc-cap.ic.gc.ca/pls/apc_anon/apeg_practice.practice_form
3. The Amateur Radio Exam Generator is at:
https://www.ic.gc.ca/eic/site/025.nsf/eng/h_00040.html
4. The ExHaminer Study software for Windows is at: <https://wp.rac.ca/examiner-v2-5/>
5. VE3YT has an excellent question-based guide available at ve3yt.com
6. There are plenty of good resources for both basic and advanced exam study courtesy of the Cold Lake Amateur Radio Society at: <http://www.clares.ca/va6hal%20training.html>

Contact SARC if you wish to write the Basic or Advanced Exam. If you pass we'll even give you a year free as a SARC prospective member!

Newly Licensed? When you receive your paper license in the mail, it will come with a form that can be filled out and mailed to the Radio Amateurs of Canada office, at which point an introductory RAC one-year membership will be set up. Introductory memberships are identical to our existing basic memberships and you will receive The Canadian Amateur magazine for one year.



HAMpuzzle V1.2

Our new students are often confused by the block diagrams for receivers and transmitters. A freeware program to practice assembling block diagrams for the Canadian Amateur Radio Basic certification exam runs under Microsoft Windows (but also works flawlessly on Ubuntu 10.04 + Wine 1.2.2)

HAMpuzzle V1.2 (2014 04) <https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle12.zip>

Be sure to download at least one set of Diagrams from the web page and deposit the bank(s) in the same folder as the program. For Basic:

https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle_Diag_Basic.zip

Radio Amateurs of Canada is pleased to make the HAMpuzzle© program available and extends sincere thanks and congratulations to François Daigneault, VE2AAY, for writing and providing it as freeware to anyone wishing to download it.

~ RAC

SURREY AMATEUR RADIO basiccourse

OBTAIN YOUR FEDERAL AMATEUR RADIO CERTIFICATE

7-WEEKS • ON-LINE • \$80

Starts Monday, September 13—contact sarc@ve7sar.net



- Ideal for outdoors activities. Long range communications anywhere for free without commercial infrastructure
- Use satellite communication to speak around the world, perhaps even to an astronaut
- Participate in 'Radio Sports' like Contesting and Hidden Transmitter Hunts
- Enhance your personal and your community's preparedness in an emergency
- Use a radio, computer, smartphone or tablet for free worldwide digital communications
- Practice an exciting hobby or start a career opportunity



<https://separ.ca/>



<http://ve7sar.net>

More information needed? Click: <https://bit.ly/SARCcourses> or use the QR code above

The Ham Crossword On

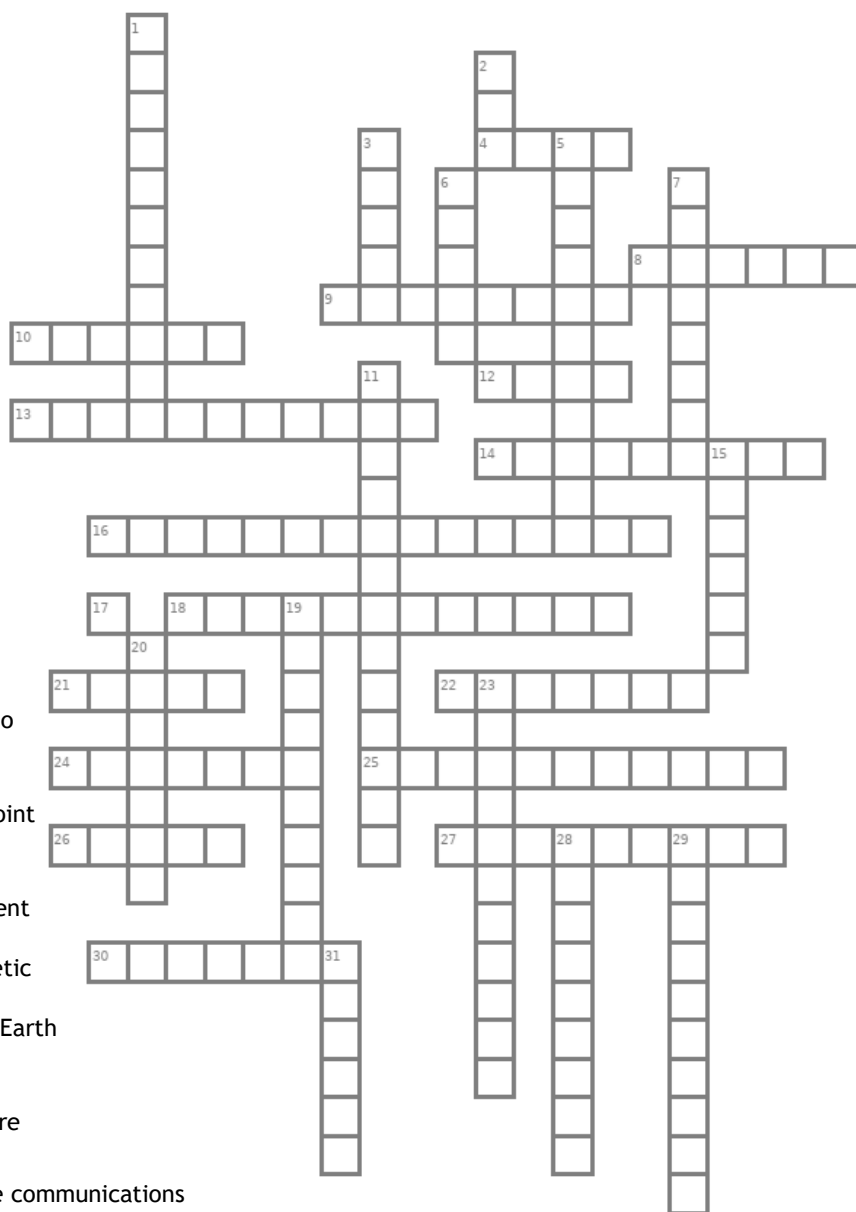
Down

1. loss of signal strength
2. maximum usable frequency
3. related to the Sun
5. solar radiation most responsible for ionization in the outer atmosphere
6. magnetic solar disturbances visible on the sun
7. a signal that skips several times
11. after the sun sets this happens to the D and E layers
15. colorful and visible solar light phenomenon
19. causes the radio wave to lose energy in the ionosphere
20. discoverer of electromagnetic fields
23. movement through a medium
28. a sharp atmospheric temperature transition between cold and warm air
29. the formation of ions
31. radio waves that travel a path near the Earth

Across

4. solar generated radio energy
8. years between new solar cycles
9. the limiting frequency at or below which a radio wave is reflected
10. variations in signal strength
12. distance from the transmitter to the nearest point where the sky wave returns to Earth
13. approximate rotation period of the sun in days
14. the same radio wave arrives at a slightly different time
16. a combined wave with both electric and magnetic fields
17. region between about 75 and 95 km above the Earth
18. changes in the radio wave due to reflection, refraction, or passage through a magnetic field
21. the ionosphere is _____ ionized just before dawn
22. the frequency that provides the best long range communications
24. a weak or wavering distorted signal usually at night
25. to do with the region between the stratosphere and exosphere
26. _____ waves travel in a straight line
27. energy emitted as particles or waves
30. a radio wave guided between two inversions

Propagation



The answer key is on page 103



Radio Amateurs of Canada

RAC scholarship awarded

It is with great pleasure that RAC British Columbia / Yukon Director Keith Witney, VE7KW and Scholarship Chair Al Eros, VE4ZB, announce the awarding of a \$1,000 scholarship to Levente Buzás, VA7QF, on behalf of all Radio Amateurs of Canada members. Levente is a graduate research student at the Department of Electrical and Computer Engineering at the University of Victoria in British Columbia.

Every year, through the RAC Foundation, Radio Amateurs of Canada provides grants and scholarships to worthy community programs and to young Canadian Amateurs who are studying at the post-secondary level. RAC operates the RAC Foundation in cooperation with the Community Foundation of Ottawa (CFO) which administers and invests the donated funds and disburses the earnings from those invested funds to grant applicants, based upon the advice of the RAC Board. All grant applications should be submitted to the RAC Foundation for processing and recommendation.

Note: This year, the deadline has been extended to November 30 to compensate for the delays caused by the global pandemic.

Upon hearing the good news, Levente, VA7QF, wrote:

“I would like to thank all those Canadian Amateurs who have generously donated to the scholarship fund, and the RAC Board for awarding me the privilege of receiving this award.

My graduate research is on the design, development and licensing of an open source radio communications subsystem (ground and space stations) for the ORCASat nanosatellite, which has been endorsed by Radio Amateurs of Canada to operate in the 435-438 MHz Amateur satellite allocation after its launch next year.



The system (design files, code, etc.) which I am developing is released to the public domain to be used by Amateurs around the world as they wish. The details can be found at: <https://gitlab.com/ORCASat/ttc>

If you wish to donate or require further information about the RAC Scholarships and

Grants Program, please visit our Scholarships page on the RAC website at the link provided below or contact Al Eros, VE4ZB at VE4ZB@rac.ca.

<https://wp.rac.ca/grant-information/>

~ AL Eros, VE4ZB

Canadian Amateur Radio Hall of Fame

—Welcome aboard Helen and Neil!

As reported in the July-August 2021 issue of The Canadian Amateur magazine, the Canadian Amateur Radio Hall of Fame's Board of Trustees is pleased to announce that Helen Archibald, VA1YL, of Port Williams, Nova Scotia and Neil King, VA7DX of Vancouver, British Columbia have joined the Board of Trustees for three-year appointments.



Helen Archibald, VA1YL, achieved her Amateur Radio certification and call sign VE2YAK in Quebec in 1992 because she “wanted to be able talk to her husband Fred, VE2SEI and her daughter Anne, VE2WHO, who started going on expeditions to activated rare IOTA islands in 1991. In 1992 she communicated with them again at Charlton Island (VE8CWI) in James Bay. She also

wanted to operate the Guides on the Air event.”

In 1994 Helen, a member of the West Island ARC, went with her family on the club expedition to St Paul Island as CY9CWI. She “became hooked on IOTA expeditions and she has been on about 15 annual IOTA contest expeditions to many Maritime, islands, making thousands of contacts.”

When she operated in the Guides on the Air Contest in 1992, a YL told her about the Canadian Ladies Amateur Radio Association (CLARA) net. Helen didn't know that there were nets! When the CLARA net controller moved away Helen became Net Controller and is still serving in this position on 40m and 20m.

In 1993 Helen got her Advanced and her daughter Margaret became VE2ZOO at age 11. In 2003, Helen and Fred moved to Nova Scotia and she became VA1YL and Fred became VE1FA, and they joined both the Kings County ARC and the Halifax ARC. Helen still enjoys being the CLARA Net Controller on 40m and 20m. Helen and Fred look forward to the end of the pandemic so they can resume Field Days and IOTA expeditions!

Born and raised on the West Coast of Canada, Neil King, VA7DX, was first licensed in 1979 as VE7CVM, attained his Advanced certification in 1980 and acquired the call VA7DX in late 1999. “An avid HF, VHF and UHF contester, preferring DX to sleep and CW to SSB, Neil has also dabbled in meteor scatter, EME, tropo and satellite operation from VE7 as well as DX locations such as 7P8 and 3DA0.

Current DXCC count is 327 and looking forward to adding to the list in the coming cycle.”

Neil has worked in the Information Technology sector for over 50 years, the last 21 as an IT consultant specializing in interim management, leadership skills and coaching, strategic planning and outsourcing. Since 2010, Neil has primarily worked overseas in fascinating places such as Beijing, Ulaanbaatar, Singapore, London, Johannesburg and DR Congo.

Neil is a member of Radio Amateurs of Canada (Maple Leaf Operator), the Coquitlam Amateur Radio and Emergency Services Society, Orca DX and Contest Club, BCFMCA, INDEXA and the Northern California DX Foundation. He is also actively involved in the British Columbia Wireless Amateur Radio Network (BCWARN).

For more information about the Canadian Amateur Radio Hall of Fame please visit:

<https://www.rac.ca/carhof/>



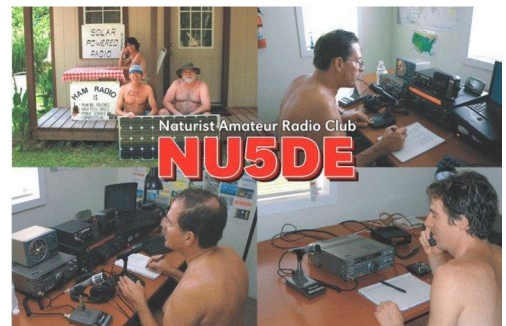
The Naturist Amateur Radio Club

The Naturist Amateur Radio Club of Mc Dade, Texas using call sign NU5DE celebrated the 90th anniversary of the American Association for Nude Recreation National Convention, and introduced their newly designed QSL Card.

A little history about the Naturist Amateur Radio Club... Ham Radio operations started during Nude Recreation Weekend in the early 90's. One of the first efforts happened from Hippie Hollow, a clothing optional county run park in Austin, TX. A long wire was run along the cliffs, just a short distance from the shoreline.

The rig was run using a couple of heavy duty batteries, but contacts were few and far between, mainly due to the poor location. A vertical was also used at one point, but still limited contacts. The call sign used belonged to Bob, KF5KF. After little luck from Hippie Hollow, the decision was made to operate from Star Ranch Nudist Resort, about 40 miles from Austin in a little town called McDade. Bob operated from his house during the week and on the weekend he moved his equipment from home to Star Ranch. This caused a dramatic increase in the number of contacts. Bob changed his call sign to N5KF in the fall of 1996. This call was used in July, 1997 from Star Ranch. In the fall of 1997 the Naturist Amateur Radio Club obtained the vanity callsign of NU5DE.

More information about the club can be found at www.nu5de.org



September 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
For details on all SARC events, go to ve7sar.net						
			1	2	3	4 Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey CONTEST: CO QSO Party (all mode) OTC Open—10-Noon Trunk Sale
5 CONTEST: CO QSO Party (all mode); TN QSO Party (all mode)	6 Labour Day CONTEST: TN QSO Party (all mode)	7 1930 SEPAR Net 2000 SARC Net	8 SARC Annual General Meeting 1900-2100	9	10	11 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: WAE DX (SSB); AL QSO Party
12 CONTEST: WAE DX contest (SSB); AL QSO Party (all mode)	13 On-line Basic Course 19:00 hrs	14 1930 SEPAR Net 2000 SARC Net	15	16	17	18 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: IA, TX, NJ, NH QSO Party (all mode); WA State Salmon Run (all mode)
19 CONTEST: IA, TX, NJ, NH QSO Party (all mode); WA State Salmon Run (all mode)	20 On-line Basic Course 19:00 hrs	21 1930 SEPAR Net 2000 SARC Net	22 1900 SARC Exec Meeting	23	24	25 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: ME QSO party (all mode) CQ WW DX (RTTY)
26 CONTEST: ME QSO party (all mode) CQ WW DX (RTTY)	27 On-line Basic Course 19:00 hrs	28 1930 SEPAR Net 2000 SARC Net	29	30		

Contest Details: <http://hornucopia.com/contestcal/contestcal.html>

October 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	For details on all SARC events, go to ve7sar.net				1	2 Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open & Basic Course Exam—10-Noon CONTEST: CA QSO Party (all mode)
3 CONTEST: CA QSO Party (all mode)	4 On-line Basic Course 19:00 hrs	5 1930 SEPAR Net 2000 SARC Net	6	7	8	9 Coffee: 0730-0930 OTC Open—10-Noon CONTEST: NV, AZ, PA, SD QSO Party (all mode)
10 CONTEST: NV, AZ, PA, SD QSO Party (all mode)	11 Thanksgiving (Canada) No Class	12 1930 SEPAR Net 2000 SARC Net	13 SARC General Meeting 1900-2100	14	15	16 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: NY QSO party (all mode)
17 CONTEST: NY & IL QSO party (all mode)	18 On-line Basic Course 19:00 hrs CONTEST: IL QSO party (all mode)	19 1930 SEPAR Net 2000 SARC Net	20	21	22	23 Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open & Basic Course Exam—10-Noon
24/31 CONTEST: CQ WW DX (SSB)	25 On-line Basic Course 19:00 hrs	26 1930 SEPAR Net 2000 SARC Net	27 1900 SARC Exec Meeting	28	29	30 Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open CONTEST: CQ WW DX (SSB)

Contest Details: <http://hornucopia.com/contestcal/contestcal.html>



ARDF: Foxes & Bunnies

The Annual SARC Fox Hunt—August 28, 2021

Saturday, August was the date for this year's annual SARC 'Fox' Hunt. As usual the venue was in South Surrey's Crescent Park, a large venue with both forested trails and fields suitable for a picnic. The weather cooperated wonderfully providing mild temperatures and blue skies after a couple of days of much needed rain.

The briefing started at 9am, once five 80m foxes had been hidden throughout the park. A beacon had been activated allowing the competitors, many of them first timers, to practice their ARDF skills.

At 10am the foxes automatically activated as programmed and the hunt was on.

This year there were approximately 25 hunters with a welcome complement of 'Junior' hunters joining the Novice and Advanced groups, and yes, the receivers are easy enough to use even for a 5-year old.

The first finisher returned after an amazing 22 minutes, impressive given the amount of territory that had to be covered.

What followed was a barbecue expertly prepared by Brenda James with assistance of Heather Brodie and Anitha and Anil Cherian... Thank you.

We also thank fox placers Jeremy VE7TMY, Jan VA7VJ and Thomas VE7TXL. Special thanks to Chief planner Anton VE7SSD, who once again provided a smooth running and fun family event.

~ John VE7TI







A brief history of direction finding

We think of radio navigation and direction finding as something fairly modern. However, it might surprise you that direction finding is nearly as old as radio itself. In 1888, Heinrich Hertz noted that signals were strongest when in one orientation of a loop antenna and weakest 90 degrees rotated. By 1900, experimenters noted dipoles exhibit similar behavior and it wasn't long before antennas were made to rotate to either maximize signal or locate the transmitter.

Of course, there is one problem. You can't actually tell which side of the antenna is pointing to the signal with a loop or a dipole. So if the antenna is pointing north, the signal might be to the north but it could also be to the south. Still, in some cases that's enough information.



John Stone patented a system like this in 1901. Well-known radio experimenter Lee De Forest also had a novel system in 1904. These systems all suffered from a variety of issues. At shortwave frequencies, multipath propagation can confuse the receiver and while longwave signals need very large antennas. Most of the antennas moved, but some — like one by Marconi — used multiple elements and a switch.

However, there are special cases where these limitations are acceptable. For example, when Pan Am needed to navigate airplanes over the ocean in the 1930s, Hugo Leuteritz who had worked at RCA before Pan Am, used a loop antenna at the airport to locate a transmitter on the plane. Since you knew which side of the antenna the airplane must be on, the bidirectional detection wasn't a problem.

Read the full article:
<https://hackaday.com/2021/08/19/wheres-that-radio-a-brief-history-of-direction-finding/>

~ Hackaday

***The popularity of 80 m foxhunts is increasing
because of the better directional characteristics
(with less reflections) of HF versus 2m***

The RX80M is the second generation of the popular directional foxhunt receiver designed by Les Tocko VA7OM and produced by Dave Miller VE7HR.

The RX80M receiver tunes 3.51 MHz to 3.60 MHz and is ready to use, complete with 9v battery, antenna, earbuds and internal 100 dB attenuator. Sensitivity is 0.4 uV for 10 dB signal to noise ratio.

Determine the general direction of the fox with the RX turned broadside and the button depressed, then home in precisely on the null with RX turned sideways. An instructional video describing this technique at <https://youtu.be/YK3gETNc2jU>.



Now also available – low power 80 m transmitter...

TX-3 transmits a continuous 8 mW on 3.579 MHz in Morse Code - MOE (2 dashes, 3 dashes, 1 dot). Hang it from a branch and let the counterpoise dangle down or trail along the ground. The TX-3 comes with batteries, a 6 ft antenna and 6 ft counterpoise for a receive range of ~ 300 m

To order the RX or TX, contact JohnVA7XB@gmail.com.

Coming soon – higher power, programmable TX80M foxhunt transmitters

This is a non-profit volunteer project of SARC in support of amateur radio



**80 m ARDF foxhunt receiver
\$125 + shipping**



**Low Power 80 m transmitter for
FoxOring or foxhunt training
\$15 + shipping**

Local Ham Gear For Sale

More listings at hamshack.ca

For sale are **Four 8' long tower sections** = 32' free standing. The bottom anchors are missing as they were left in the concrete after it was taken down. **\$75.00 or best offer.**

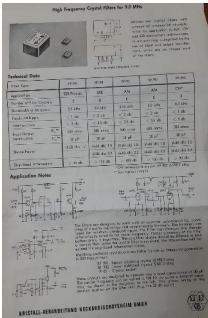
Kjeld also has a rather large Marine Radio (HF boat anchor?) sitting at his home and he'd like to find a new home for it. If you're interested contact him.

Contact: Kjeld VE7GP 604-531-6396 or VE7GP@telus.net

70 cm Fast Scan TV Transmitter

For sale is an analog fast scan (NTSC standard) ATV transmitter in a hardened and waterproof metal case. Suitable for mounting outdoors. Last used by hams at Simon Fraser University on an emergency communications project in the early 1990s. Runs on 12 VDC. Approximately 100 feet of power/antenna/control cables included. As is, but if it doesn't work to your satisfaction you can return it. **\$100 OBO.**

Contact: Kevin McQuiggin VE7ZD/KN7Q mcquiggi@sfu.ca



Crystal Filters

\$60 each or both for \$100, plus shipping.

I have both the XF-9A for SSB TX and the XF-9B for SSB RX plus matching crystals, sockets and spec sheet. These are high quality crystal filters made in Germany. The TX is unused and the RX is like new.

I can also supply crystals to heterodyne 10-15-20-40-80 m to a 9 MHz IF using a 5 -5.5 MHz VFO. And, if you are building a receiver, I can provide 9 MHz IF transformers to match.

WANTED: Old National Geographic and Reader's Digest Magazines.

Contact: John VA7XB va7xb@rac.ca or 604-591-1825

A REAL SDR Transceiver! Flex-3000 fully SDR 100W Transceiver C\$750 with FireWire card and headset adapter (laptop not included)

Great condition but rarely used now. Details at <https://www.flexradio.com/documentation/flex-3000-owners-manual/>



8-foot stainless steel whip \$25

Free Oscilloscope

Early 80s solid state Tektronix scope. Has a trace, may need some work but you can't beat the price... Free

Contact: John VE7TI ve7ti@rac.ca



SURREY AMATEUR RADIO COMMUNICATIONS

Radio-Active

Profiles Of SARC Members

Fred was born in Vancouver, one of two children, the other one being his sister. He tells me he has reached the ripe old age of 85. He attended UBC for one year but the war years brought financial hardship for many, forcing Fred to go back to work therefore he was not able to complete his studies. Fred worked in the pressroom of The Province Newspaper and after the merger in 1957 he worked for Pacific Press as a printer. He married his childhood sweetheart, Marion, in 1957. They had 2 sons, one who lives in Langley and one in South Surrey, and now has 8 grandchildren. After marriage Fred and his family lived in Richmond for a while before moving to Pasadena, California where they lived for 2 years. It was there through a fellow worker Fred developed an interest in ham radio. In 1963 the family moved to their present home in South Surrey which originally was on 7 acres. On this property they had horses and chickens. Later they sold 5½ acres of the property.

Fred got his Ham License in 1975 with the call sign of VE7CJG. He chuckles on remembering a fellow ham and Elmer friend called John McPherson who, around the same time, got the call sign of VE7BOO on Halloween. Fred began building his radio shack in his basement with a Viking Ranger

CW transmitter and a Hallicrafters SX115 receiver, which was borrowed from VE7BOO. After one year he assembled an HW-101 Heathkit transceiver. For those who have visited Fred's shack you have seen that he has added several times to have his present set up. He also has 2 towers one with a SteppIR Antenna and one with a TH-6 tri-band beam.

From 1980 to 1994 Fred became inactive in ham radio because of his increasing responsibility as Director of Production for Pacific Press and his management role. His wife Marion returned to university and became a teacher and then received her Master's in learning disabilities. In 1994 Fred retired and his wife followed suit in 1995. The couple travelled to such places as Australia and England as well as travelling around USA and becoming Arizona 'snow birds'. They travelled for 12 years. Fred states that he had a ham radio in his RV, surprise, surprise! Fred became the emergency Coordinator for BC under RAC and then the Section Manager for BC/Yukon for 5 years. He stepped

*Fred Orsetti
VE7IO*



SURREY AMATEUR RADIO COMMUNICATIONS

Right: The VE7IO
Contest Team

Below: Fred
operating CW at
Field Day



Right: At Field Day
with John VE7TI

Below: Fred and
Marion



Right: SEPAR school
hands-on workshop
introducing students
to radio
communications.

Far right: Fred briefs
for a SEPAR exercise



out of all this for a while. Then he was approached by SEPAR and asked to take over the Coordinator's position. This was a position he held for many years as he brought SEPAR from relative obscurity to a core of community volunteers ready to help with additional communications capability for the City of Surrey, should the need arise. During Fred's tenure as SEPAR coordinator, school visits were arranged, presentations and workshops were held at City libraries and at the Surrey Museum. An active fund-raising program allowed the purchase of the SEPAR trailer, and the SEPAR promotional video was produced as well [<https://youtu.be/6B-qFOTtqoQ>].

This brought Amateur Radio's capability and the many facets of the hobby to the attention of many kids, teens and their parents. Fred states that he has a lot of people to thank who have assisted him in building up SEPAR, including Gord Kirk, who is presently the Coordinator.

Fred loves working DX and contesting and has lots of certificates for this on the wall of his shack. He went to London, England in 1982 with a group of fellow hams and operated from the old BC House near Piccadilly. Fred began traveling to the Hamvention in Dayton Ohio in 1995 and went every year until around 2017. At the Hamvention he attended he attended Contest University. This was the "source" for Dx and contest information. In 1995 there were approximately 30,000 other



SURREY AMATEUR RADIO COMMUNICATIONS

operators from around the world, this was/is ham radio Mecca.

Along with other experienced contesting Elmers, Fred was eager to introduce more SARC members to contesting. He offered his vast knowledge and multi-position station for training. Led by Fred, several SARC members formed a contest team and performed very well in various events from a base at VE7IO. And, when COVID struck, and team contesting was no longer possible there, Fred researched and implemented Distributed Multi-Operator contesting where we could operate from individual stations and coordinate our efforts through Fred's base station [see *The Canadian Amateur* magazine September - October 2020].

Increasingly, Fred finds that these days he has to "step back" due to family commitments and the fact that he freely admits, "I am getting older". One of the things that Fred likes most about being a ham is the opportunity to meet people of various backgrounds and describes this as the highlight of his radio life. He enjoys seeing people succeed in developing their radio skills.

Fred is a patient man always ready with kind and encouraging words for new hams. One of the things that can be difficult for some hams is balancing their ham radio involvement with their family life. To this Fred stated he has never put radio in front of his family which helps him keep his priorities straight. Fred is always willing to open up his radio shack to others in developing their contesting skills. Thank you Fred for all you have done, and all you are doing for amateur radio.

I know many of our newer members don't know you personally nor the tremendous contributions you have made to the hobby, and both SARC and SEPAR over the years, not to mention the Elmering you have done... including yours truly.

~ John VE7TI

*With contributions of
text from Jinty Reid
VA7JMR*



*Top: On the roof of Firehall One
installing antennas*

*Bottom: Fred at the controls of one
of the radios at VE7IO*

Dear John

For the last year I have been watching with great interest the publication you publish under the title "Communicator" and please accept my sincere congratulations for the interesting and original material and for the quality of the articles addressed to both beginners and more experienced radio amateurs. I hope you continue this good work, always finding the required and necessary courage.

Almost for 20 years I was also involved in the publication of our National bi-monthly magazine called "SV-News" and I can recognize when something is really good to read. With this opportunity I would like to ask your permission in order to

translate and publish some of your articles in our magazine from time to time. Full credit of course from the source will be given in the translation.

Regards and keep it up....

73

Manos G. Darkadakis SV1IW

Former RAAG President (2004-2015)
IARU Liaison (2015-2019)
Radio Amateur Association of Greece
National Society - Member of International
Amateur Radio Union (IARU) since 1959.

SURREY AMATEUR RADIO COMMUNICATIONS

The OTC Report

Back on the air!

John Brodie VA7XB



It's been quite a busy summer at the OTC, following the partial lifting of COVID restrictions in early July. Improvements to the radio room have continued, with the willing assistance of a few volunteers who have come out regularly following our now-recommended Saturday breakfast meets at Denny's Restaurant. So the radio room is getting to have a more polished look to it as the incidental chores get completed one by one and we get better organized.

The biggest job of the summer was to install a proper RF ground system, now completed. In doing so, we took as guidance grounding strategy from commercial installations. The ground is comprised of buried copper strap in a series of 3 interconnected 4 ft deep holes outside the radio room. This turned out to be a multi-day project, the major challenge being the augering of 6 inch diameter holes in dense, stony, clay soil. To ensure a good electrical connection to surrounding soil we placed **bentonite clay chips** around the copper. Since that time, the holes and interconnecting trenches have

been flooded with water to encourage the clay to hydrate and swell. Bentonite was purchased from a local well drilling supply company [see the article describing bentonite's properties following this OTC Report].

The grounding improvement was partially necessitated by our experiencing mutual RF interference between two radios operating simultaneously at different frequencies, as well as high ambient RF noise levels. Time will tell how effective this measure has been, just one more step in the long road to having 2 HF stations fully operational and functioning efficiently. The tower was grounded in a similar fashion, but for lightning protection.

Over the years, SARC and SEPAR have accumulated a lot of surplus equipment from donations. Unneeded items will be on sale at our Sept. 4th parking lot sale. Inventorying of these items and determining target sale prices has taken some considerable effort. Although one purpose of this sale is make space and raise cash, it has a more important objective, namely



ng Centre

SURREY AMATEUR RADIO COMMUNICATIONS

to allow members to enjoy the benefits of acquiring used equipment at reasonable prices and to encourage them to get on the air. Members may also bring personal items for sale on Sept. 4th.

Our revitalized Saturday morning breakfast and get-togethers at the OTC offer members not only a chance to socialize and to help with chores, but to bring their problems and questions to the group for help by the more experienced members. We hope that the crowd will continue to grow.

~ John VA7XB



SURREY AMATEUR RADIO COMMUNICATIONS



Just what is bentonite?

The 'OTC Report' mentions bentonite as an aid to achieve better RF grounding... but what exactly is this stuff?

In geology, the term bentonite is applied to a type of claystone composed mostly of montmorillonite. It forms by devitrification of volcanic ash or tuff, typically in a marine environment. This results in a very soft, porous rock that may contain residual crystals of more resistant minerals, and which feels soapy or greasy to the touch. However, in commerce, the term bentonite is used more generally to refer to any swelling clay composed mostly of smectite clay minerals.

Sodium bentonite expands when wet, absorbing as much as several times its dry mass in water. Because of its excellent colloidal properties, it is often used in drilling mud for oil and gas wells and boreholes for geotechnical and environmental investigations. The property of swelling also makes sodium bentonite useful as a sealant, since it provides a self-sealing, low permeability barrier. It is used to line the base of landfills, for example. bentonite is part of the backfill material used for waste isolation. Various surface

modifications to sodium bentonite improve sealing performance in geo-environmental applications, for example, the addition of polymers.

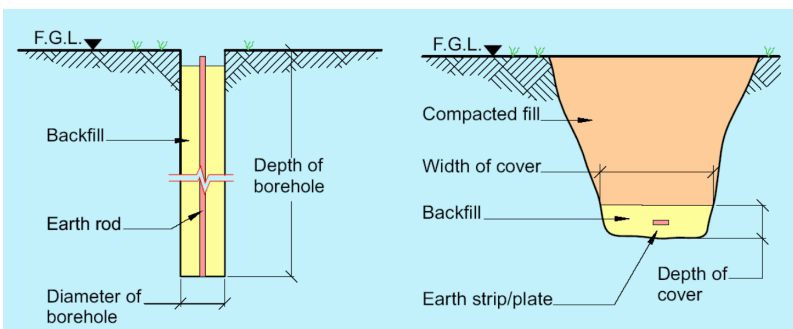
Here in BC, bentonite was installed in slurry walls in North Vancouver, Quesnel and Williams Lake to stop the migration of railway diesel contamination to adjoining properties. It was also used to seal up abandoned environmental monitoring wells, and is used as pond liner to stop the water from seeping away.

Sodium bentonite can be combined with sulfur as fertilizer prills. These permit slow oxidation of the sulfur to sulfate, an important plant nutrient, and maintain sulfate levels in rainfall-leached soil longer than either pure powdered sulfur or gypsum. Sulfur/bentonite pads with added organic fertilizers have been used for organic farming.

The main uses of bentonite are in drilling mud and as a binder, purifier, absorbent, and carrier for fertilizers or pesticides. As of around 1990, almost half of the US production of bentonite was used as drilling mud. Minor uses include filler, sealant, and catalyst in petroleum refining. Calcium bentonite is sometimes marketed as fuller's earth, whose uses overlap with those of other forms of bentonite.

Bentonite is used in a variety of pet care items such as cat litter to absorb pet waste. It is also used to absorb oils and grease.

The bentonite is the yellow material



SURREY AMATEUR RADIO COMMUNICATIONS

What you should know when using ground enhancement material

Under almost all soil conditions, the use of a ground enhancement material will improve grounding effectiveness. Some are permanent and require no maintenance. You can use them in areas of poor conductivity, such as rocky ground, mountaintops and sandy soil, where you can't drive ground rods or where limited space makes adequate grounding difficult with conventional methods.

Bentonite is used to lower the resistance to earth by providing ground enhancement effectively reducing the resistance between the soil and earth electrode (such as copper earth rod or earth mats) by retaining moisture. This inherent ability to absorb and retain rainwater increases the electrical conductivity of the earthing compound in positive correlation to local climatic conditions, specifically average rainfall levels. Typically, the compound has a 3 ohms.m resistivity level - Bentonite compound is a cost-efficient material for backfill of earth electrodes and improving performance when it is physically impossible to drive the earth rods deeper and where challenging ground conditions exist such as rock, granite, etc.

Chemical treatment or backfilling of the soil in close proximity to the location of an underground earthing electrode is an established and traditional method of lowering ground resistance for substation earthing on high resistivity ground - such soil backfilling for electrical grounding improvements is commonly used.

There are several kinds of ground enhancement material available. But use care when choosing the material. It should be compatible with the ground rod, conductor, and connection material. Some options include bentonite clay, coke powder, and specially engineered substances.

Conduction in bentonite clay only takes place via the movement of ions. Ionic conduction can

only occur in a solution, which means the bentonite clay must be moist to provide the required resistance levels. When bentonite clay loses moisture, its resistivity increases and volume decreases. This shrinkage results in a discontinuity in the contact between the bentonite clay and surrounding soil, which further increases system resistance.

A noncorrosive low-resistance enhancement substance is a conductive cement that you can install wet or dry. Depending on the substance, it will not leach into the soil and meets EPA requirements for landfill. The railroad and utility industries have successfully used this material. When installed dry, it absorbs moisture from surrounding soil and hardens, retaining moisture within its structure. When used dry, no mixing is required, and you achieve maximum efficiency in a matter of days. This is because it absorbs enough water from the surrounding soil. You can also premix it with water to a heavy slurry. You can add this to the trench containing the grounding conductor or use it around a ground rod in an augered hole. The material binds the water into a cement making a permanent, highly conductive mass.

Some products offer a test-proven resistivity of 0.12 ohm-m or lower, compared with 2.5 ohm-m for bentonite clay. Unlike bentonite clay, the cement-like material does not depend on the continuous presence of water; nor does it require periodic charging treatments or replacement.

An ideal ground enhancement material should not require maintenance. When designing or installing a buried grounding system, look for materials that do not dissolve or decompose over time, require periodic charging treatments or replacements, or depend on the continuous presence of water to maintain conductivity.

~ Internet sources including:

<https://www.powerandcables.com/product/earth-tapes-rods-bars-copper/bentonite/> and <https://youtu.be/hHtIYboE8NE>

SURREY AMATEUR RADIO COMMUNICATIONS

The Contest Contender

Inaugural SKCC All-Canada Celebration

The Straight Key Century Club's new on-air event promotes the club's many Canadian members. At this time the SKCC board wanted to extend the fun of hand key CW throughout the year. VE9SKCC is the special call sign that has been granted for this "KEY" event. We refer to the event simply as the "Canadian Operating Event."

VE9SKCC runs from September 1st through the 30th. It's a perfect time to introduce or re-acquaint hams to the fun of hand-keyed Morse code sent with straight keys, bugs, and side-swipers. Members and non-members alike are welcome to hunt the Canadian based VE9SKCC. Non-members are encouraged but not required to use straight keys for their VE9SKCC contacts. This year we hope to field VE9SKCC operators in all Canadian Provinces.

You can track your progress working the event stations by referring to the Stats section on the Canadian Operating Events page. Check for regular updates in your standings for Number of Areas, Bands and VE9SKCC operators to document your success.

Earn a QSL card by making at least one contact with any VE9SKCC event station. Work all Provinces for a basic sweep; check the Op Schedule and Operator Map links to find where and when the VE9SKCC stations are operating.

For SKCC members VE9SKCC is a great opportunity to make lots of progress toward various club awards. Contacts with VE9SKCC stations are valid for SKCC awards purposes. Also, by signing up as a VE9SKCC Operator you can readily log dozens or hundreds of award-eligible QSOs with other SKCC members.



SURREY AMATEUR RADIO COMMUNICATIONS

Would you like to sign on as one of our VE9SKCC Operators? You can try it for just an hour or two. Or reserve a series of time slots throughout the month. Code speed and station sophistication are not important. The on-air exchanges tend to be fairly relaxed. Please contact the Regional Coordinator in your area for more info. He or she will be eager to sign you up. Our VE9SKCC Operators are key to a successful event!

Be sure to listen for our VE9SKCC operators during September and work 'em when you hear 'em!

73,

~ The Canadian Operating Event Committee

Periodic Table of Radio Contests 2021

	Sept	Oct	Nov	Dec
Multimode	4 0000Z CWops CW Open	4 2300Z California QSO Party	3 2100Z ARRL SS CW	8 0000Z ARRL 160
off-the-air	11 0000Z WAE SSB	12 2300Z Oceania CW	13 0000Z WAE RTTY	14 2300Z ARRL 10
CW	18 1600Z WA/NJ/NH QSO Parties	19 varies Worked All Germany	20 2100Z ARRL SS SSB	22 0000Z RAC Winter
SSB	25 0000Z CQWW RTTY	26 2400Z CQWW SSB	27 0000Z CQWW CW	28 2400Z HAPPY HOLIDAYS
Digital	30 0000Z CQWW SSB	31 2400Z CQWW SSB		
VHF/UHF				



SURREY AMATEUR RADIO COMMUNICATIONS

Your SARC Membership

If you have not already renewed, your membership in SARC expired as of last June 1st.

You are requested to renew your membership prior to the next AGM, which is tentatively scheduled for September 9th.

Note that only those whose membership is in good standing may vote or be eligible to run for a Director's position.

Payment may be made in one of several ways:

1. Use PayPal on the SARC website: www.ve7sar.net
2. If we meet, bring a cheque or cash to the AGM on September 9th.
3. Mail a cheque to our Treasurer Scott Hawrelak
13935 80A Avenue, Surrey V3W 6P5



Dues are as follows:

- Individual \$31
- Individual (if RAC member) \$26
- Family \$41
- Family (if RAC member) \$36

Thankyou for taking care of this as soon as possible.

~ John Brodie VA7XB
Membership



Hamshack.ca

- Receives 12,000 or so visits per week
- Has over 500 registered users
- Usually sits at about 250 active listings as items seem to move very quickly

Most importantly, I have continued with the amateur radio club listing initiative and recently added a self-enrolment form for clubs to add their own listings on the site. In addition, living through a pandemic made me realize the important of emergency planning, and the importance that amateur radio plays in the emergency management field, by providing emergency communications services to public agencies and other organizations. Group representatives adding their organization to the site now have the ability to list the emergency communications services provided by their group.

It is anticipated that this emergency communications inventory will be accessed by public and other organizations to augment existing communications capacity for inclusion in emergency management planning.

~ Don Rosberg, VE7DXE

SURREY AMATEUR RADIO COMMUNICATIONS



General Meeting Schedule

September and October 2021

SARC Annual General Meeting

A reminder that our SARC AGM happens on September 8th at 7pm at the Surrey Fire Services Training Centre, located at 14923 64 Avenue Surrey.

[map link <https://what3words.com>]

The AGM notification and agenda is available as an appendix to the July-August 2021 Communicator:

bit.ly/JulAug21Communicator

Mid-Island AREDN data net

The Nanaimo Amateur Radio Association is bringing High Speed Amateur Radio Data Networking To Mid Vancouver Island.

They have started a project to establish an amateur radio high speed data mesh network using RF for the Ladysmith, Nanaimo, Gabriola Island, Parksville, Qualicum Beach and Sunshine Coast areas.

Why do they want to do this. Here's just a partial list of what we can use this for:

- Multiple Voice Channels (Digital)
- Texting and Email Applications
- Winlink Packet Radio
- Remote Station Control and Monitoring
- Repeater Site Control and Monitoring
- Video
- Radio Hotspots

And that's just a partial list, all using RF links.

There is an opportunity to take this project to the next level by setting up a series of data relay stations at some of the very best communication sites in mid-Vancouver Island.

See: <http://www.ve7na.ca/aredn-local-mid-island/>

At our October 13th SARC monthly meeting, Chris Anton VE7TOP will be presenting on this project.



SURREY AMATEUR RADIO COMMUNICATIONS



SARC Summer Meetings

July and August 2021



SURREY AMATEUR RADIO COMMUNICATIONS

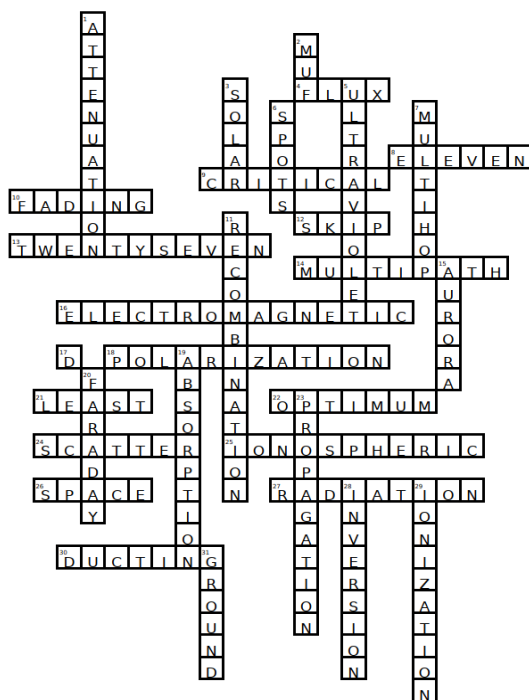
News from Russia...



Many of our newer members may not be aware that SARC member Mike Zavarukhin holds dual Russian and Canadian callsigns and for many years was our 'secret weapon' on CW at Field Day.

Mike recently wrote: "Things are more or less good in Russia. My farm manager decided to find a new job, it will be a while to find and train a new one. So will stay in Russia the next year or two with some short visits to Canada. Garden Centres are the main portion of the business, managed fairly well by the partners. We have 8 shops now in or town with 600,000 people, and we are the key player on the local market.

~ 73, Mike RW0CN - VE7ACN



Crossword answer key

From page 80

SURREY AMATEUR RADIO COMMUNICATIONS



Another 'win' for our SARC contest team. This one for First place for the most contacts, high power, mixed modes.

Congratulations to John VA7XB, Steve VE7SXM and Jan VA7VJ

Team VE7IO including SARC members Fred VE7IO, John VE7TI, Jim VE7FO and Stan VA7NF captured the top BC score (multi-op) plaque.

Vancouver area frequency list

Name	Frequency	Offset	CTCSS
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VE7RSC (Primary Repeater)	147.360	+0.600	110.9
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VE7RSC (Secondary Repeater)	443.775	+5.0	110.9
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VE7RPT (Primary Regional Repeater)	146.940	-0.600	
Optional 136.5 Rcvr			

Simplex 1	(VHF)	146.550	
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Simplex 2	(VHF)	147.420	
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Simplex 3	(UHF)	446.550	
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Simplex 4	(UHF)	447.425	
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Other frequencies in the Greater Vancouver area:

Primary: Coquitlam/Abbotsford	146.430
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Primary: Inter-Municipal Group 3	146.445
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Primary: Vancouver; Mission; Sec. Coquitlam	146.460
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Primary: Kent-Mission; Sec. Richmond	146.475
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Primary: Inter-Municipal Group 2	146.490
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Primary: New West; Sec. Richmond	146.505
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National Calling / FM Simplex Group I	146.520
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Primary: North Shore; Port Coquitlam	146.535
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Primary: Bowen Island; Surrey	146.550
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Intermunicipal Group 1 Coordination	146.565
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Primary: Lions Bay/Vancouver/Delta/Langley	146.580
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Primary: Port Moody; Sec: Burnaby	146.595
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Secondary: Vancouver/Surrey	147.420
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Secondary: Vancouver (UBC) / Maple Ridge	147.450
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Primary: White Rock/Chilliwack; Sec. No. Shore	147.480
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Secondary: Burnaby/Pitt Meadows	147.510
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Primary: Delta; Sec: Abbotsford	147.540
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Primary: Hope; Sec: Delta; ALSO EMBC	147.570
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We're
QRT

This really is
QRT... again!

John Brodie VA7XB

I had stated in the last Communicator that my message was to be a true QRT, as I am stepping down as President. Although my tenure officially ended as of last June 1 (the first day of our new fiscal year) I am in fact still on the job until such time as a new Executive is formed and a President elected after the AGM on Sept. 8th. So now I will say “Adios” for the second time.

I have been a member of SARC since about 2000. I first got licensed in 1960 so had been away from ham radio for nearly 40 years while I completed my education, got married and raised a family of two boys. My long absence from the hobby meant that nearly everything was new to me. Around year 2000, SARC had only about a dozen members who attended meetings in a classroom at Tamanawis Secondary School. Field Day was supported by even fewer members, and it was not an auspicious introduction for my re-entry to ham radio.

In those days, other than Field Day, we had few activities to inspire participation. Several years later a few members collaborated with the Langley Club to organize a digital workshop, as these new modes were coming into prominence. This really marked the beginning of SARC's growth, spurred by interest in the workshop, which was well attended. As the membership began to climb,

over the next 10 years the club eventually achieved what I would call “critical mass” i.e. our growing resources and talents of members led to a synergy of sorts. A contest group was formed which was instrumental in the club's successes in Field Day scores for many years thereafter and even to the present day.

Starting around 2015 we were successful for several years in qualifying for Gaming Grants, which have provided the funds to renew our equipment and establish a state-of-the-art HF station as well as revitalize our repeater sites at a better location. Ham classes were begun during this period and have continued to enlarge and bring new recruits into the hobby and our organization. The Communicator, the official organ of SARC, has also grown over the last decade and is recognized around the world as one of the premier ham radio publications.

The foregoing just touches on the many factors that have led to SARC's success over the years. The challenge for the new Board will be to maintain the momentum, keep up the interest of members, and expand our horizons so that SARC doesn't become complacent and stale.

~ John VA7XB

SARC SOCIETY DIRECTORS 2020-2021

PRESIDENT

John Brodie VA7XB
[president at ve7sar.net](mailto:john@ve7sar.net)

VICE PRESIDENT

Steve McLean VE7SXM
vice [president at ve7sar.net](mailto:steve@ve7sar.net)

SECRETARY / WEBMASTER

Jeremy Morse VE7TMY
[secretary at ve7sar.net](mailto:jmorse@ve7sar.net)

TREASURER

Scott Hawrelak VE7HA
[treasurer at ve7sar.net](mailto:scott@ve7sar.net)

DIRECTORS

Gord Kirk VE7GK
(SEPAR Liaison)

Kevin McQuiggin VE7ZD / KN7Q

John Schouten VE7TI
(SARC Publications/Blog/Social
Media & Courses)
[communicator at ve7sar.net](mailto:john@ve7sar.net)
[course at ve7sar.net](mailto:john@ve7sar.net)

Stan Williams VA7NF

SARC MEMBERSHIP, NET & CONTEST MANAGER

John Brodie VA7XB
[membership at ve7sar.net](mailto:john@ve7sar.net)

SARC QSL MANAGER

(pro tem) John Brodie VA7XB

SARC REPEATER MANAGER VACANT

[repeater at ve7sar.net](mailto:repeater@ve7sar.net)

A look back...

From The Communicator—October 2011

SARC Communicator

SARC Snapshot Operator Skills Training

SARC's "Operator Skills Training" program was launched on Saturday and Sunday, Sept. 24-25 at John VA7XB's QTH under the watchful guidance of Jim Smith VE7FO. The initial group consists of those members who have had some HF experience, expressed an interest in contesting and may become the trainers of the future.



Enthusiastic participants at the initial stages were John VE7AXU, John VE7TI, Kelvin VA7KPH, Alan VA7BIT and Susan VE7IIE. The coaching was focused around the CQ WW RTTY contest and trainees were divided into two shifts so that each person could get some operating time. Jim started by going over concepts involved in contesting in general, RTTY fundamentals, tuning and logging using N1MM and MMTTY software. Each trainee then was given the opportunity to make and log some contacts, first using

"search and pounce" mode, then moving on to "run" mode which involved sending CQ and waiting for stations to come to us. Between quiet periods, once the rhythm of the exchanges was established, the contacts came fast and furious. Considering that radio black-outs from solar activity were experienced throughout the weekend, and only a few hours were actually spent on making contacts, it was a productive exercise. The group made 250 contacts in 38 CQ zones in 41 countries including a few in Europe, the South Pacific and South America. Claimed score was 91,368.

Next challenge: an SSB or CW contest! Many thanks to Jim for his diligent coaching and giving up of most of a weekend for the benefit of SARC.

~ John VA7XB



September—October

heading into fall and a new ham year

Remember our Annual General Meeting on September 8th at the Fire Training Centre. Proxy votes are accepted with written acknowledgement from the absent member and will count towards the quorum. Please bring a mask to comply with COVID rules in city buildings.

Chris Anton VE7TOP will present on the Amateur Radio Emergency Data Network (AREDN) via Zoom for our October 13th meeting.

We hope to see you there.

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

We are looking for a SARC Net Manager. Its not a difficult job and, if you have some time to spare, we'd like to hear from you. Basically it involves scheduling someone to do the Tuesday evening weekly net.

	SARC Net 20:00 Hrs
1 st Tuesday Standby	Jean-Luc VA7JLU Reg VA7ZEB
2 nd Tuesday Standby	Jinty VA7JMR Sheldon VA7XNL
3 rd Tuesday Standby	Rob VE7CZV REG VA7ZEB
4 th Tuesday Standby	Kapila VE7KGK John VA7XB
5 th Tuesday Standby	Jinty VA7JMR John VE7TI
Want a turn at Net Control? Contact the SARC Net Manager	

Down The Log...

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the [Surrey Fire Service Training Centre](#),
14923 - 64 Avenue,
Surrey, BC. Here is a
what3words link and map:
<https://what3words.com/markers.addiction.ozone>

Weekly SARC Social

Saturday between 0730
and 0930 hrs at the
Denny's Restaurant, 6850
King George Blvd., Surrey
BC

Workshops

Saturday between 1000
and Noon at the OTC
5752 142 Street, Surrey
BC

SEPAR Net

Tuesday at 1930 hrs local
on 147.360 MHz (+)
Tone=110.9

SARC Net

Tuesday at 2000 hrs local
on 147.360 MHz (+)
Tone=110.9

VE7RSC Repeaters

2m North: 147.360MHz+
Tone=110.9Hz
IRLP node 1736
Echolink node 496228

2m South: 147.360MHz+
Tone=103.5Hz Fusion
capable; No IRLP/EchoLink

1.2m: 223.960 Mhz -1.6
Tone=110.9

70cm: 443.775MHz+
Tone= 110.9Hz
IRLP node 1737



We Have A SARC Patch!

These are suitable for sewing on a jacket, cap or your jammies, so you can proudly display your support for SARC.

The price is \$4 each or three for \$10 and they can be picked up at a meeting or the weekly Koffee Klatch.

We thank our sponsors for their support of SARC

Please support them.



Successful Guide to the
Basic Exam
for the
Canadian Amateur Radio
Operator Certificate

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- E-transfer \$20 to vicd@uwaterloo.ca, of which \$10 supports the Kitchener Waterloo club's educational work.

www.ve3yt.com for the guide, my intro book and cw course

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